

Evaluation of the Local Update of Census Addresses 98 (LUCA 98)

FINAL REPORT

This evaluation study reports the results of research and analysis undertaken by the U.S. Census Bureau. It is part of a broad program, the Census 2000 Testing, Experimentation, and Evaluation (TXE) Program, designed to assess Census 2000 and to inform 2010 Census planning. Findings from the Census 2000 TXE Program reports are integrated into topic reports that provide context and background for broader interpretation of results.

Karen L. Owens

Planning, Research, and
Evaluation Division

Intentionally Blank

CONTENTS

EXECUTIVE SUMMARY	v
1. BACKGROUND	1
1.1 Local Review for the 1990 Census	1
1.2 LUCA for the Census 2000 Dress Rehearsal	2
1.3 LUCA Program for Census 2000	2
1.4 Overview of the LUCA 98 Program	3
1.5 Updating the MAF and the DMAF with LUCA 98 Results	7
2. METHODS	9
2.1 Census files used in this evaluation	9
2.2 Definition of a LUCA 98 participant	9
2.3 Levels of geography used for analysis	10
2.4 Separate analysis for some geography	10
2.5 Original source of an address	10
2.6 Type of Enumeration Area.	11
2.7 Type of address	11
2.8 Applying quality assurance procedures	12
3. LIMITS	12
3.1 Using 1990 Census housing unit counts	12
3.2 The BSA size variable was overstated	12
3.3 Addresses sent to LUCA 98 Recanvass that came back as “added”	13
3.4 Comparing results to previous censuses	13
3.5 Special place and group quarters addresses may have been miscoded as housing units	13
3.6 We used different MAF extracts for analysis	13
4. RESULTS	14
4.1 How many governmental units participated in LUCA 98 and what are their characteristics?	14
4.2 How many addresses did LUCA 98 participants add to the MAF and what are their characteristics?	19
4.3 How many addresses did LUCA 98 participants delete from the MAF and what are their characteristics?	30
4.4 How many addresses did LUCA 98 participants correct on the MAF and what are their characteristics?	36
4.5 How many addresses did participants appeal and how many of them were in the final	

census?	40
4.6 What is the overall assessment of the LUCA 98 program?	41
Acknowledgments	42
References	42
Appendix A: LUCA 98 participant actions on addresses sent	44
Appendix B: LUCA 98 participant adds by state	45
Appendix C: LUCA 98 adds as a percentage of addresses on the initial list	46
Appendix D: LUCA 98 adds by size of basic street address	47
Appendix E: LUCA 98 adds by Type of Enumeration Area	48
Appendix F: LUCA 98 adds by official block code agreement	49
Appendix G: LUCA 98 adds by DMAF deliverability	50
Appendix H: Final census status of LUCA 98 adds	51
Appendix I: LUCA 98 deletes by state	52
Appendix J: LUCA 98 corrections by state	53
Appendix K: LUCA 98 adds that were not added by any other valid operation	54

LIST OF TABLES

Table 1. LUCA 98 participants by type of governmental unit	15
Table 2. LUCA 98 address updaters by type of governmental unit	16
Table 3a. LUCA 98 participation by region of the United States.	16
Table 3b. LUCA 98 participation by region of the United States (American Indian governments)	17
Table 4. LUCA 98 participation by 1990 Census housing unit count	18
Table 5. LUCA 98 adds in collection blocks	20
Table 6. LUCA 98 adds by type of address	21
Table 7. LUCA 98 by size of basic street address	22
Table 8. LUCA 98 adds by type of address information	23
Table 9. LUCA 98 adds by official block code agreement	24
Table 10. LUCA 98 adds by original source category	25
Table 11. LUCA 98 participant adds in Block Canvassing and Field Verification	28
Table 12. LUCA 98 range of deletes in collection blocks	31
Table 13. LUCA 98 deletes by type of address	32
Table 14. LUCA 98 deletes by size of basic street address	32
Table 15. LUCA 98 deletes by type of enumeration area	33
Table 16. LUCA 98 deletes by original source category	34
Table 17. LUCA 98 participant deletes in Block Canvassing and Field Verification.	36
Table 18. LUCA 98 corrections in collection blocks	37
Table 19. LUCA 98 corrections by size of basic street address	38

Table 20. LUCA 98 corrections by original source category 39

Table 21. LUCA 98 participant corrections in Block Canvassing and Field Verification ... 40

EXECUTIVE SUMMARY

The U.S. Census Bureau conducted the Census 2000 Local Update of Census Addresses 98 program in mailout/mailback areas of the country from May 1998 to June 2000. We invited local and tribal governments to participate and those who participated were sent lists of housing units in the census blocks in their area. Governments updated the lists by adding, deleting, or correcting addresses. The Census Bureau then verified most of those updates. This report documents the results of the Local Update of Census Addresses 98 program. A summary of those results follows.

How many governmental units participated in the Local Update of Census Addresses 98 and what are their characteristics?

There were 17,424 governmental units eligible to participate in the Local Update of Census Addresses 98 program. A total of 9,263 governments participated. The housing units in these participants' jurisdictions geographically covered approximately 92 percent of the housing units in areas eligible for Local Update of Census Addresses 98. Although 53 percent of eligible governments participated, a smaller percent (36 percent) of eligible governments provided any updates in the form of adds, deletes, or corrections. We recommend that the Census Bureau investigate ways to increase government participation. Especially focusing on ways to aid the governmental unit in providing updates once they have agreed to participate.

The majority of eligible governments were in the Midwest region of the United States, however that region had the lowest participation rate. In general, smaller governments (as determined by the number of housing units in the government's jurisdiction in 1990) had lower participation rates than larger ones. Governments may have not participated because they did not have enough resources to do the task, or they knew that larger governments in their area were already updating addresses for the Census Bureau.

How many addresses did Local Update of Census Addresses 98 participants add to the Master Address File and what are their characteristics?

Local Update of Census Addresses 98 participants reviewed address lists and added addresses for residential units in their jurisdiction that they believed did not exist on their review materials. They added a total of 5,302,094 addresses to the Master Address File, which represents a 6.5 percent increase in housing units in mailout/mailback enumeration areas.

There were about 3.8 million blocks in areas where we conducted the Local Update of Census Addresses 98 program and approximately 2.7 million of those blocks were sent out for participants to review. About 18 percent of those blocks had at least one address added by a Local Update of Census Addresses 98 participant.

Approximately 95 percent of Local Update of Census Addresses 98 participant adds were included on the initial census address list. Many were added to the initial list as “provisional” adds, to be verified after the first census mailing. Approximately 58 percent of adds were confirmed to exist as a residential address in the Block Canvassing operation or the Local Update of Census Addresses Field Verification operation. About 58 percent of adds were in the final census housing unit inventory.

The majority of Local Update of Census Addresses 98 adds had city-style address information, however we are not sure how many of those addresses were mailing addresses. About 64 percent of adds were single unit structures. In fact, in most states, single units accounted for at least half of the Local Update of Census Addresses 98 adds.

How many addresses did Local Update of Census Addresses 98 participants delete from the Master Address File and what are their characteristics?

The Local Update of Census Addresses 98 participants deleted (or declared nonresidential) any address on their address list that they believed did not exist in their jurisdiction as a residential unit. They deleted a total of 490,613 addresses from the Master Address File. Of the 2.7 million blocks reviewed by the participants, about 5 percent had at least one participant delete. The deletes represent about 0.6 percent of the addresses sent to participants.

Approximately 60 percent of Local Update of Census Addresses 98 deletes were single unit structures. However, the state level percentages for this statistic varied greatly. Some states had a large percentage of deletes in multi-unit structures. Deletes in multi-unit structures can be attributed to entire multi-units that participants deleted, or a single unit contained in a multi-unit structure.

How many addresses did Local Update of Census Addresses 98 participants correct on the Master Address File and what are their characteristics?

Local Update of Census Addresses 98 participants corrected a total of 2,762,050 addresses on their address lists. The corrections included geographic as well as address information. Of the 2.7 million blocks that participants reviewed, about 6 percent had at least one participant address correction.

Unlike the adds and deletes, multi-unit structures accounted for more than half (51 percent) of Local Update of Census Addresses 98 participant corrections. These may be an indication that participants attempted to focus on multi-unit designation problems on the Master Address File.

How many addresses did participants appeal and how many of them were in the final census?

Local Update of Census Addresses 98 participating governments appealed a total of 313,853 addresses. A total of 303,410 of those addresses were added to the Master Address File after approval by the Census Address List Appeals Office that was set up by the Office of Management and Budget. There were 141,580 appeal addresses that were included on the final Census address list.

What is the overall assessment of the Local Update of Census Addresses 98 program?

The address list for the Local Update of Census Addresses 98 program included addresses from various Master Address File sources, including the 1990 Address Control File, two U.S. Postal Service Delivery Sequence File deliveries, and the Block Canvassing operation. There were approximately 81.5 million addresses from these sources on the Master Address File that were eligible for review in the Local Update of Census Addresses 98 program.

About 53 percent of the 17,424 eligible local and tribal governments participated in the Local Update of Census Addresses 98 program. There were approximately 3.8 million blocks in enumeration areas appropriate for the Local Update of Census Addresses 98 program and about 2.7 million blocks were reviewed by participating governments. Participating governments made address updates (adds, corrections, and deletes) in 664,189 blocks. Of the 2.7 million blocks participants reviewed, about 18 percent yielded at least one add, 5 percent yielded at least one delete, and 6 percent yielded at least one correction.

The participants of the Local Update of Census Addresses 98 program contributed to the address list in many areas. Although the updates had a large impact on the update of the Master Address File for Census 2000, the timing of the program with other Census 2000 address updating operations introduced some complexity in determining the true impact of updates to the final census results. However, we do estimate that about 505,530 addresses in the final census were provided by Local Update of Census Addresses participants and may not have been provided by any other census operation.

In order to understand the true impact of LUCA in the future, we recommend that the Census Bureau allow sufficient time for the completion of government updates prior to Block Canvassing activities. This would reduce the complexity of processing, as well as eliminate the need for another operation to validate updates.

1. BACKGROUND

The U.S. Census Bureau established a program to work with local and tribal governments to update the address list for Census 2000. This program is referred to as the Local Update of Census Addresses (LUCA) or Address List Review. The LUCA program is required by the Census Address List Improvement Act of 1994 [Public Law 103-430].

This evaluation documents the results of the LUCA program conducted in enumeration areas where the Census Bureau chose to send respondents questionnaires in the mail. In these mailout/mailback areas, for Census 2000, we refer to the LUCA program as "LUCA 98."

1.1 Local Review for the 1990 Census

The Census Bureau conducted two operations to improve housing unit coverage for the 1990 Census that involved the assistance of local governmental units. In both operations, governmental units had the opportunity to review census housing unit counts in their jurisdiction. The Precensus Local Review was conducted prior to Census Day, and the Postcensus Local Review was conducted after Census Day.

1.1.1 Precensus Local Review

The Census Bureau conducted a Precensus Local Review during the 1990 Census in all mailout/mailback enumeration areas. The objective was to provide local officials of functioning governments the opportunity to review preliminary housing unit and special place counts for areas in their political jurisdiction. The Census Bureau delivered counts of housing units to local officials to review, identify and document discrepancies. Census Bureau staff resolved some discrepancies in the office. If they could not resolve discrepancies in the office, then additional field review occurred. For some discrepancies, they selected blocks to be recanvassed based on specific criteria.

A total of 21,048 governmental units were eligible to participate in the 1990 Precensus Local Review, and 16.3 percent of those governments participated. Of the 3,440 governmental units that participated, 2,883 of them challenged housing unit counts. The remaining 557 participants either agreed with the counts or they disagreed but they did not provide proper documentation to identify discrepancies. Approximately 121,000 blocks were challenged and Census Bureau field representatives recanvassed 52 percent of those blocks. The 1990 Precensus Local Review added 367,313 housing units to the national housing inventory (Commerce, 1993).

1.1.2 Postcensus Local Review

The Census Bureau conducted the Postcensus Local Review operation after the census to help improve housing unit coverage after Census Day. Local government officials had the opportunity to review post-census housing unit counts and group quarters population counts, as

well as boundary maps to identify any major discrepancies. Unlike the Precensus Local Review, governmental units in all enumeration areas were eligible to participate in the Postcensus operation.

A total of 9,847 governmental units out of the 39,198 eligible governmental units participated in the 1990 Postcensus Local Review. About 67 percent of participants (6,602 governmental units) challenged the Census Bureau's housing unit counts with the proper documentation. They challenged a total of 270,650 blocks and Census Bureau enumerators recanvassed 62 percent of the blocks. The Postcensus Local Review operation added 80,929 housing units to the national housing inventory in 1990, which translated to an add rate of 0.08 percent.¹

1.2 LUCA for the Census 2000 Dress Rehearsal

The Census Bureau conducted the LUCA program in all three sites for the Census 2000 Dress Rehearsal. Local and tribal governments could review and update a list of housing units in mailout/mailback and update/leave enumeration areas. The City of Sacramento and the Menominee Tribal governments participated, and 51.6 percent of the 60 eligible governments in the South Carolina site participated. These governments accounted for 98 percent of the 1990 Census housing units in the South Carolina site.

Participating governments provided feedback in the form of recommended adds, deletes, or corrections of addresses to the Master Address File (MAF). Participants added a total of 988 addresses to the MAF in Sacramento, 11,621 addresses in South Carolina, and 25 addresses in Menominee (Howard, 1999).

1.3 LUCA Program for Census 2000

The Census Bureau invited all eligible functioning local and tribal governments to participate in the Census 2000 LUCA program. Governmental units were eligible for one or both of the operations depending on the type of enumeration areas contained in their jurisdiction. The two operations were:

- LUCA 99: Operation for any functioning government that had any addresses in areas where the Census Bureau did not plan to use a mailout/mailback enumeration method, but rather an update/leave or update/enumerate enumeration method. These areas generally had non-city-style addresses, that is, addresses that do not have a house number and street name for mail delivery but have location descriptions and map spots on the census address list. For these areas, participating governments reviewed counts of housing units in blocks in their jurisdiction. The Census Bureau recanvassed blocks that

¹ In areas where Postcensus Local Review and the 1990 Census Recanvass operation were conducted concurrently, the Census Bureau could not document the 1990 Postcensus Local Review coverage yield separately from the 1990 Recanvass coverage yield.

the governments identified as having incorrect housing unit counts.

- LUCA 98: Operation for any functioning government that had any addresses in areas where the Census Bureau planned to use a mailout/mailback enumeration method. These areas generally have city-style addresses, that is, addresses with a house number and street name (“123 Main Street” for example). For these areas, participating governments reviewed the address list for their jurisdiction and added, corrected, deleted or identified addresses on the list as nonresidential. The Census Bureau verified some of these updates in the field through the Block Canvassing operation or a special LUCA 98 Field Verification operation.

This evaluation states the results of the Census 2000 LUCA 98 program. Please see the Census 2000 evaluation report titled “Evaluation of the Local Update of Census Addresses 1999 (LUCA 99)” for results of the LUCA 99 program.

1.4 Overview of the LUCA 98 Program

The Census Bureau conducted the Census 2000 LUCA 98 program between May 1998 and June 2000. The following steps define the operation:

- We invited all functioning local and tribal governments with mailout/mailback areas in their jurisdiction to participate in the program for Census 2000. Governments that wished to participate had to identify a liaison and sign a confidentiality agreement with the Census Bureau.
- We provided participating governmental units with the portion of the Census 2000 address list for blocks in their jurisdiction (in either paper or computer-readable format), the related maps covering their jurisdiction, and a tally of housing unit addresses for each block in their jurisdiction.
- We instructed local and tribal governments to review the materials and make corrections to the address lists and maps. See section 1.4.3 for a description of specific updates governments were instructed to make.
- We validated the address information provided by LUCA 98 participants through the Block Canvassing and LUCA 98 Field Verification operations.
- We provided participating local and tribal governments with detailed feedback/final determination materials showing the results of Block Canvassing and LUCA 98 Field Verification.
- We gave local and tribal governments the opportunity to appeal final Census Bureau decisions to a Census Address List Appeals Office established by the Office of

Management and Budget. See section 1.4.5 of this report for more details.

1.4.1 Geography for LUCA 98

The Field Division's Regional Offices assigned each census collection block² a type of enumeration area (TEA) code. This code identified which Census 2000 address updating operation we would apply to the housing units in the block, and how those units would be enumerated during the census. The LUCA 98 program was conducted in the following TEAs:

- Mailout/Mailback (TEA 1): These blocks contain addresses that are predominantly city-style³ and can be used for mail delivery. Census questionnaires were mailed to the address and residents were to mail them back.
- Military (TEA 6): These are blocks on U.S. military bases. A Mailout/Mailback (TEA 1) enumeration strategy was used for the housing units in these areas.
- "Urban" Update/Leave (TEA 7): These areas were identified as having mostly city-style addresses, however, many units may not have unit designations or many residents may have elected to receive their mail at post office boxes. The Census Bureau was concerned that the city-style addresses of these residents may not appear in the census address list. To ensure questionnaire delivery to the largest number of residences, update/leave procedures were employed where the address list was updated and the questionnaire delivered simultaneously.
- "Urban" Update/Enumerate (TEA 8): These areas were initially in TEA 1 due to the predominance of city-style mailing addresses. Most of these blocks are in American Indian reservations. Field representatives updated the address list and enumerated residents at the same time.

1.4.2 Supplemental LUCA 98

The Supplemental LUCA 98 universe consists of governmental units that were originally eligible for the LUCA 98 program. For one of the following reasons, the Geography Division of the Census Bureau (GEO) produced their review materials later than planned:

- The governmental unit had an address list that contained an insufficient number of housing units at the time of LUCA 98 production

² A census collection block is a geographic area bounded on all sides by visible features, such as streets, roads, railroad tracks, or rivers and by invisible features, such as a county line, city limit, property line, or imaginary street extension.

³ City-style addresses are those with a house number and street name, such as "123 Main Street."

- The governmental unit was in the Census 2000 Dress Rehearsal
- The governmental unit incorporated late in the decade
- The governmental unit was a tribal government that GEO initially thought was outside the scope of eligible LUCA 98 governmental units

Geography Division decided that they would wait to produce LUCA products for these governments until they updated the address list with the results of the Block Canvassing operation. Subsequently, Field Division reclassified some or all of the blocks in these areas from a mailout/mailback enumeration area to an update/leave enumeration area (TEA 9). Therefore, GEO also had to wait for the address list to be updated with the results of the Address Listing operation before they produced review materials for some of these governments.

Geography Division used the LUCA 98 system to produce Supplemental LUCA materials for blocks that remained in mailout/mailback areas, but they used the LUCA 99 system to produce materials for blocks in TEA 9. This report includes the results of government participation and the field recanvass for the Supplemental LUCA program blocks that remained in TEA 1 and were processed in the LUCA 98 system.

1.4.3 Local and Tribal Governments Review Materials

Local and tribal participants had three months from receipt of all materials to review the address list and maps. The participant could make the following changes to their address list:

- Additions: The participant could add any address they believed to be missing from the Census 2000 address list.
- Corrections: The participant could correct the house number, any component of the street name, unit designation, ZIP code, or geographic information (including changing the block information).
- Deletions: The participant could delete addresses they believed to be nonexistent or a duplicate of another address.
- Nonresidential addresses: The participant could identify addresses they believed were not residential.
- Outside Jurisdiction addresses: The participant could identify addresses that they believed were not in their jurisdiction.

1.4.4 LUCA 98 Field Verification

Once participants returned a list of addresses with action codes that indicated additions, corrections, and deletions, GEO processed these actions into the MAF. Geography Division then identified LUCA-submitted addresses that required field verification. The initial plan was to update the MAF with all LUCA 98 updates before we conducted the Block Canvassing operation. Hence, Block Canvassing would serve as the verification of LUCA 98 updates.

Due to necessary delays in the LUCA program, all LUCA 98 updates could not be incorporated into the MAF before Block Canvassing. Therefore LUCA 98 updates that needed to be verified later were compared to the MAF (as updated by Block Canvassing) and sent to a special LUCA 98 Field Verification operation when needed.

Generally, LUCA 98 adds and corrections with sufficient address information were field verified if they met any of the following conditions:

- The LUCA address was not found, was deleted, or was found and flagged as nonresidential in the Block Canvassing operation.
- Multi-unit structures where the number of within-structure units as indicated by the LUCA 98 participant is greater than the number of units as currently indicated in the MAF.
- The Census 2000 collection block for the LUCA address (where supplied by the LUCA participant) is not equal to the Census 2000 collection block number for the official MAF block.

Field representatives in the LUCA 98 field verification operation made the following types of updates:

- Correction: The address was verified as residential and a correction was made.
- Delete: The address was not verified or it was a duplicate address.
- Nonresidential: The address was verified, but it was not a residential address.
- Verification: The address was verified as a valid residential address.

1.4.5 LUCA 98 Appeals

A local or tribal government that was not satisfied with the results of their detailed feedback could formally appeal the Census Bureau's action. The LUCA 98 Appeals process consisted of the following:

1. The local government had 30 days to file an appeal after they received feedback. The local or tribal government had to submit documentary evidence of the appealed address to the Census Address List Appeals Office.⁴
2. Once the eligible local government filed an appeal, the Census Bureau had 15 days to provide a standard or customized appeal response with any supporting documentation to the Appeal Official.
3. The Appeal Official made the final decision (and provided written documentation of the findings) on whether to add the address to the MAF and the Census 2000 enumeration process.

1.5 Updating the MAF and the DMAF with LUCA 98 results

As previously mentioned, the Census Bureau conducted the LUCA 98 program in areas where we planned to enumerate persons through the mail delivery of questionnaires. For these areas, we used the 1990 census Address Control File (ACF) as the starting point for creating the MAF. Then, we used a series of files and operations to update the MAF. Some of these files and operations included:

- the November 1997 Delivery Sequence File (DSF) from the U.S. Postal Service (USPS) (in some areas of the country we used earlier versions of the DSF to update the MAF),
- the September 1998 DSF,
- the Block Canvassing Operation,
- the LUCA 1998, and
- the LUCA 98 Field Verification operations.

The LUCA 98 program overlapped with two other MAF updating sources. They were the September 1998 DSF and the Block Canvassing operation.

The Decennial Master Address File (DMAF) is a subset of the MAF that is the address list for Census 2000. All LUCA 98 adds with sufficient address information were added to the MAF. However, LUCA 98 adds were only delivered to the DMAF if they were geocoded and met specific DMAF criteria. In general, the DMAF included all MAF addresses that represented potential residential units that were geocoded to a census block.

LUCA 98 adds that were verified in the LUCA 98 Field Verification operation (as opposed to Block Canvassing) were delivered to the MAF as “provisional” adds before they were verified. These “provisional” adds on the DMAF were eligible for inclusion in the final census, however,

⁴The Census Address List Appeals Office was a temporary Federal office, established separate from and independent of the Department of Commerce by the Office of Management and Budget, to administer the appeals process for the LUCA 98 program.

updates from subsequent operations may have deemed the address ineligible for inclusion in the final census.

2. METHODS

2.1 Census files used in this evaluation

Geography Division created the files we used for the LUCA 98 participation analysis in the Results section 4.1 of this report. There were two governmental unit level files, one for LUCA 98 and one for Supplemental LUCA 98. The files included variables related to participation that the GEO obtained from different production files.

We used the March 2001 MAF extracts to produce the majority of the housing unit level numbers for this evaluation. These extracts contain housing units, group quarters, and special place addresses provided by every MAF building operation that happened before and during Census 2000. The extracts also contain information about actions taken on the addresses by the different Census 2000 MAF building operations. We limited this evaluation to housing unit addresses, and therefore removed group quarters and special place addresses from our analyses.

We used the November 2000 MAF extracts to produce one statistic of interest in this report. We characterize LUCA 98 participant adds by whether the block provided by the operation agrees with the current official block (see Results section 4.3.5). The block flag variable we used for this analysis was not correct on the March 2001 extracts due to a software processing error; therefore, we reverted to using the November 2000 extract for this statistic.

2.2 Definition of a LUCA 98 participant

There were multiple steps involved in taking part in the LUCA 98 program for Census 2000. Geography Division sent functioning governmental units invitation letters. All governmental units interested in participating were to indicate so, provide GEO with the name of a liaison, and sign a confidentiality agreement. For this report, we used the following criteria to define a governmental unit as a participant in the program:

- they agreed to participate, and
- they submitted a signed confidentiality agreement, and
- they did not dropout or disincorporate as a governmental unit at any time, or
- they provided an address update⁵.

⁵ Some governments were not flagged as participants on the file provided by GEO. However, they provided updates to address lists which would indicate they were a participant, so they were treated as such for this report.

2.3 Levels of geography used for analysis

During field operations, collection geography, based primarily on physical boundaries, was used to help listers find units in the field. For evaluation purposes, we characterize the adds by where the housing units actually are for tabulation purposes. Therefore, in this evaluation we analyze data using tabulation geography, with one type of statistic being an exception (see Results sections 4.2.1, 4.3.1 and 4.4.1). In general, collection state and county would not be different from tabulation state and county but they could be different on occasion because of keying or other errors.

2.4 Separate Analysis for some geography

We provide characteristics of LUCA 98 participants in this report. In some cases, results for American Indian governmental units are presented in separate tables or in the text after we present information for other types of governments.

2.5 Original source of an address

Evaluations of the MAF-building operations required identification of the source of every address on the MAF. An Original Source variable, which did not exist on the MAF, was defined and created by the Planning, Research, and Evaluation Division (PRED) and the Decennial Statistical Studies Division (DSSD). This variable identifies the first operation or file to add the address to the MAF, with the following three qualifications.

- If one operation added an address, but a later operation also identified the address in a different TEA, the first operation does not receive credit for adding this address.
- An address may not have sufficient operation information to indicate how the address was added to the MAF.
- In cases where one MAF-building operation overlapped with at least one other MAF building operation and the address was added independently in each operation, we give credit to each operation. An example of this is the Original Source category “LUCA 1998 and Block Canvassing.”

Therefore, the Original Source variable identifies the first operation or operations to add the address to the TEA in which it exists for the Census, provided there is sufficient information to identify a TEA and an operation. For additional information on how this variable was defined, see the PRED TXE/2010 Memorandum Series: MAF-EXT-S-10, “Determining Original Source for the November 2000 Master Address File for Evaluation Purposes.”

When computing statistics of interest for this report, it was necessary to collapse the different values of original source into four categories defined by their relationship to LUCA 98:

- Pre-LUCA 98: The source for the address was an operation valid in TEAs 1, 6, 7 and 8 and was conducted before the LUCA 98 program. These operations include the 1990 Address Control File, the U.S. Postal Service’s DSF⁶, Block Canvassing⁷, and the Census 2000 Dress Rehearsal.
- LUCA 98 and the September ‘98 DSF: The address was flagged as a residential unit on the September ‘98 DSF and was also added in the LUCA 98 program.
- LUCA 98 and Block Canvassing: The address was added in both the LUCA 98 and Block Canvassing operations.
- Some Other Source: The LUCA 98 address is not currently located in TEAs 1, 6, 7, or 8 and an operation appropriate for the TEA where the address is located is the original source for the address.

2.6 Type of enumeration area

For the majority of statistics in this report we did not limit the analysis to the TEAs appropriate for LUCA 98. That is, TEAs 1, 6, 7 and 8 as described in the Background section 1.4.1. We do present some statistics by TEA. In those instances, the six TEAs that were not eligible for the LUCA 98 program are collapsed in an “inappropriate for the operation” category.

One statistic in this evaluation is limited to the TEAs appropriate for LUCA 98. That is the geographic clustering of adds, deletes and corrections. Refer to the Results sections 4.2.1, 4.3.1 and 4.4.1 for those data.

2.7 Type of address

This evaluation looks at addresses by type of address information. We classify addresses into five categories based on the highest criterion met. The categories are: complete city-style, complete rural route, complete P.O. box, incomplete address and no address information.

⁶There were multiple DSF deliveries. The second one for Census 2000 overlapped with the LUCA 98 program. In cases where it was impossible to identify which source provided the address first, the original source was attributed to both operations in a “LUCA 98 and September 1998 DSF” category.

⁷The Block Canvassing operation overlapped with the LUCA 98 program. In some cases Block Canvass results were provided to LUCA participants and in some cases LUCA results were included in the Block Canvassing operation. In cases where both operations provided the address independently, the original source was attributed to both operations in a “LUCA 98 and Block Canvassing” category.

- The city-style category includes all units that had complete city-style addresses, which consists of a house number and street name.
- The Rural Route category includes units that did not have a complete city-style address but did have a complete rural route address, such as Rural Route 2, Box 3.
- The P.O. Box category includes units that did not have a complete city-style or rural route address but did have a complete P.O. Box address, such as P.O. Box 5.
- The incomplete category includes units that had some address information but did not have a complete address of any type.
- The no address information category includes units that are missing house number, street name, Rural Route, and P.O. Box information.

Addresses are further delineated by whether or not the address had a physical/location description provided during a Census 2000 field operation. For additional information on how this variable was defined, see PRED/TXE/2010 Memorandum Series: MAF-EXT-D-01, “Determining Address Classification for Master Address File (MAF) Evaluation Purposes.”

2.8 Applying quality assurance procedures

We applied quality assurance procedures throughout the creation of this report. They encompassed how we determined evaluation methods, created specifications for project procedures and software, designed and reviewed computer systems, developed clerical and computer procedures, analyzed data, and prepared this report. For a description of these procedures, reference “Census 2000 Evaluation Program Quality Assurance Process.”

3. LIMITS

3.1 Using 1990 Census housing unit counts

In order to assess the impact of individual government participation, we present government participation in LUCA 98 by their 1990 housing unit size. Some governments did not exist in 1990, therefore they did not have any housing units in 1990 and are not included in that analysis. Although the 1990 housing unit sizes are likely an underestimate or overestimate of the true current housing unit size, it was our best measure of pre-Census 2000 housing unit sizes.

3.2 The BSA size variable was overstated

The variable showing the number of housing units at a basic street address (BSA) on the MAF included all addresses indicated as DMAF deliverable during the census process. Only a subset

of these addresses remained in the census. Therefore, the size of BSA variable on the MAF is overstated relative to the size of BSA as of the end of the census. Additionally, the size of BSA variable was only determined for units with city-style address information. Units with non-city-style addresses are considered single units.

3.3 Addresses sent to LUCA 98 participants that came back as “added”

Some addresses on the MAF extracts used for analysis have an action code of “add” from LUCA 98 even though we sent them out on the address list for participating governmental units to update. The government liaisons may have missed the address on their list and added it to the list again. Or if two participants had jurisdictions that overlapped and they were given the same block to review at two different points in time then it may have been added twice by different participants.

3.4 Comparing results to previous censuses

The type of enumeration areas, enumeration methodologies, and analysis variables for Census 2000 may differ from previous censuses. Caution should be taken when comparing results across censuses. An example of an analysis variable that has changed from 1990 is size of structure-- the closest approximation being size of basic street address in Census 2000. In the 1990 census, we had a census question asking the respondent the size of structure. In Census 2000, we defined the size of basic street address based on an address-level algorithm.

3.5 Special place and group quarters addresses may have been miscoded as housing units

LUCA 98 participants may have incorrectly added or verified MAF records as housing units when the records actually referred to special places or group quarters. The LUCA 98 program did not consist of a verification of this miscoding, and we do not know how often it occurred. This miscoding would generate an overstated count of housing units in the results.

3.6 We used different MAF extracts for analysis

As stated in the Methods section, we are computing most of the statistics in the report from the March 2001 MAF extracts. However, we are computing one statistic of interest for this report from the November 2000 MAF extracts. In theory, the records on the November 2000 extracts should be the same as the records on the March 2001 MAF extracts. However, over time, additional information leads to the merging or unmerging of addresses on the MAF. This occurrence can result in small changes to the types of tallies that are in this report.

4. RESULTS

The following questions repeat the ones in the executive summary and provide expanded answers.

4.1 How many governmental units participated in LUCA 98 and what are their characteristics?

4.1.1 Participation overall

A total of 9,263 of the 17,424 eligible governmental units participated in the LUCA 98 program.⁸ The housing units in these participants' jurisdictions geographically covered approximately 92 percent of the housing units in areas eligible for LUCA 98. About 67 percent of participating governments submitted address updates in the form of adds, deletes, corrections, and nonresidential declarations.

Some of the governments that declined to participate gave the Census Bureau reasons for doing so. The majority (92.9 percent) did not provide an answer or indicated that there was "no reason" for not participating. Of those who did provide a reason, most indicated that they had no time and were too busy, they had insufficient staff to do the work, or indicated that they did not participate due to some other reason not provided as an option. Some governments also indicated that they did not participate because they had previously returned other map updates to the Census Bureau.

The Geography Division of the Census Bureau contracted with Anteon Corporation to perform a survey of the local and tribal governments eligible for the Census 2000 LUCA programs. The survey focused on the governments' experiences with the LUCA program and reasons for participation or non-participation. Anteon produced a report independent of the Census 2000 Evaluation program. Survey Results included the following highlights:

- About two thirds of the responding governments indicated that their government was at least somewhat satisfied with the LUCA 98 program.
- Over three fourths of the responding governments indicated they were interested or somewhat interested in participating in future LUCA-type programs.
- Those governments that did not participate in the program indicated that the top two factors affecting their decision not to participate in the program were the volume of work required to conduct the review, and having insufficient personnel to conduct the review.

⁸ Governmental unit eligibility and participation results for the LUCA 98 program that are reported in other Census Bureau publications may vary slightly due to changes in the production control systems.

Additional information on the Anteon survey results are in the “Results of the Survey of Selected Governments Eligible for the Local Update of Census Addresses (LUCA) Program” memorandum prepared for the U.S. Bureau of the Census.

Overall, in terms of participation, the LUCA 98 program had some success. However, another goal of LUCA was to build relationships/partnerships with local and tribal governments as part of the Census Partnership program. We were not able to make an independent assessment of that aspect of the program for this evaluation. Information pertaining to the success of the Partnership program in general (with limited LUCA specifics) can be found in the “Census 2000 Evaluation D.3: Report of Survey of Partners.”

4.1.2 Participants by type of governmental unit

Table 1. LUCA 98 participants by type of governmental unit

Type of Governmental Unit	Number of Eligible Governmental Units	Participants*	
		Number	% of eligible
American Indian	130	54	41.5
County	2,078	1,024	49.3
Incorporated Place	8,510	5,632	66.2
Minor Civil Division	6,706	2,553	38.1
Total eligible governmental units	17,424	9,263	53.2

*Participants are defined in the Methods Section 2.2.

Table 1 shows that a total of 17,424 governmental units had areas where the Census Bureau planned to use mailout/mailback enumeration methods and were eligible to participate in the LUCA 98 program. Approximately 53.2 percent of eligible governments participated in the program.

The majority of eligible governments were classified as incorporated places or minor civil divisions. Incorporated places, the largest group, had the highest rate of participation in the program at 66.2 percent of governments. All other types of governments had rates that ranged from 38 to 49 percent.

4.1.3 Participants with updates by type of governmental unit

The above results focused on those governments that agreed to participate and signed a confidentiality agreement. Now, we will look at governments that actually made any updates to the address lists they were sent. Table 2 shows the number of governmental units that provided address updates by the type of government.

Table 2. LUCA 98 address updaters by type of governmental unit

Type of Governmental Unit	Governmental units that updated addresses		
	Number	% of eligible	% of participants
American Indian	29	22.3	53.7
County	466	22.4	45.5
Incorporated Place	4,073	47.9	72.3
Minor Civil Division	1,662	24.8	65.1
Total address updaters	6,230	35.8	67.3

Although 9,263 governments agreed to participate in the program, those that made any address updates were much fewer in number. A total of 6,230 governments provided address updates. That represents 35.8 percent of all eligible governments and 67.3 percent of participating governments. Governments that did not provide any address updates may have agreed with the information on the Census address list they were provided with or may have decided not to pursue the task of updating the list. Anteon survey results also indicate that some of these governments claimed the volume of the work and insufficient staff kept them from providing updates.

4.1.4 Participation by region of the United States

Table 3a shows the participation and percent of eligible local governmental units that updated addresses by region of the United States.

Table 3a. LUCA 98 participation by region of the United States (excluding American Indian governmental units)

Region	Eligible Governmental Units*	Participants** (% of eligible)	Address Updaters*** (% of eligible)
Northeast	3,280	67.8	40.2
Midwest	9,389	41.8	30.1
South	3,250	63.2	36.7
West	1,375	73.2	63.2
Total	17,294	53.3	35.9

* Does not include American Indian governmental units

** Governments that agreed to participate, signed a confidentiality agreement, and did not drop out or disincorporate

*** Governments that provided updates to the Census address list they reviewed

The Western part of the U.S. had the highest participation in LUCA 98, where about 73.2 percent of eligible governments agreed to participate. The Midwest had the largest number of governments and the lowest participation. The Midwest also has the largest number of eligible governments, however many of them are small and may have declined to participate because they

knew a larger governmental unit was looking at housing counts for their area.

Although participation for all regions of the U.S. was above 41 percent, governments that provided address updates in these areas represent a much lower percent of eligible governments. For example, about 63.2 percent of the eligible governments in the south agreed to participate, however less than 36.7 percent provided any updates. As previously mentioned, participants may have chosen not to provide updates because they agreed with the Census address list or they decided not to pursue the task of updating the list.

The percent of participation and address updaters by region for the tribal governments is slightly different from the rest of the nation, as can be seen in Table 3b.

Table 3b. LUCA 98 participation by region of the United States (American Indian governmental units)

Region	Eligible Governmental Units	Participants (% of eligible)	Address Updaters (% of eligible)
West	79	49.37	26.58
Midwest	17	52.94	29.41
Northeast	13	15.38	15.38
South	21	19.05	4.76
Total	130	41.54	22.31

American Indian governments in the Midwest had the largest percent of participants with about 53 percent. About half of the governments in the West (the area with the most American Indian governments) participated in the program.

4.1.5 Participation by 1990 housing unit size

To get an idea of the size of governments that participated in the LUCA 98 program, we look at participation by the number of housing units the government had in the 1990 Census. Table 4 shows the percent of eligible governments that participated and the percent that made updates to the address list.

Table 4. LUCA 98 participation by 1990 Census housing unit count*

Housing unit count	Eligible Governmental Units*	Participants (% of eligible)	Address Updaters (% of eligible)
0 - 999	6,847	40.60	27.59
0 - 99	644	38.35	23.14
100 - 249	1,411	35.86	24.10
250 - 499	2,055	38.15	26.57
500 - 999	2,737	45.41	31.20
1,000 - 9,999	7,680	59.21	39.74
10,000 - 99,999	2,520	67.02	44.21
100,000 +	246	78.46	59.35
100,000 - 249,999	162	77.78	54.32
250,000 - 499,999	60	78.33	65.00
500,000 - 999,999	19	84.21	78.95
1,000,000 +	5	80.00	80.00
Total**	17,293	53.25	35.86

*This table does not include American Indian governments.

**One government did not exist in 1990 and we do not have 1990 housing unit counts associated with it.

Table 4 shows that for eligible local and tribal governments, participation in the LUCA 98 program tends to increase as the 1990 housing unit count increases. That is, larger governments appear to participate at higher rates. Smaller governments may have decided not to participate because they were aware of a larger government that was participating and updating addresses for blocks that were also in their jurisdiction.

The percentage of governments that updated addresses follows a similar pattern. However, there is a noticeable drop (about 20 percent for some groups) in the percentage of governments that actually updated addresses versus those that agreed to participate.

There were 130 American Indian governments that were eligible to participate in LUCA 98. A total of 118 of them did not exist in 1990 in their current Census 2000 form and therefore do not have available 1990 housing unit counts. The remaining 12 had fewer than 500 housing units in 1990. These twelve did not participate in the LUCA 98 program.

4.1.6 Participant updates

LUCA 98 participants could provide updates in the form of adds, corrections, deletes, nonresidential units, and out of jurisdiction units. LUCA 98 participants submitted the following updates:

- 6,956,146 adds,
- 2,356,531 corrections,

- 484,178 deletes,
- 28,483 nonresidential addresses, and
- 462,592 jurisdiction changes

These updates were only added to the MAF if the participant also submitted complete address information. The results sections that follow only characterize those LUCA 98 updates that were included on the MAF. For participant updates to the addresses that GEO sent them in LUCA 98, see Appendix A.⁹

4.2 How many addresses did LUCA 98 participants add to the MAF and what are their characteristics?

LUCA 98 participants added a total of 6,293,128 housing units to the MAF.¹⁰ Of those, 991,034 already existed on the address list. This may have occurred because a government erroneously added a unit that was already on their list. As a result, there are a total of 5,302,094 adds that were not in the initial LUCA 98 universe that we will characterize in the following sections of this report.

Some states had significantly more units added in LUCA 98 than others. Refer to Appendix B for the number of adds in each state. Units added by participants in California accounted for over 10 percent of national adds. Florida, Georgia, Illinois and New York were the only other states with over 5 percent of the total number of adds.

The percent increase of addresses added relative to addresses on the list and reviewed by LUCA 98 participating entities is 6.50 percent (5,302,094 adds divided by 81,537,188 addresses already on the MAF). The state level percentage increases ranged from 0.3 percent in the District of Columbia, to 17.2 percent in Georgia. See Appendix C for state level percentage increases.¹¹

We profile the LUCA 98 participant adds in the sections that follow. The profile will include the

⁹The table in Appendix A provides a distribution of actions (deletes, corrections, declared nonresidential) on addresses *sent* to participants in each state. The “Added” column in the table reflects those addresses that were sent to a participant (i.e. the address was already on the MAF) and the participant added the address again. See Limits section 3.3 for more information. For a distribution of addresses added (that were not already on the MAF) by state, see Appendix B.

¹⁰The number of adds reported here does not match the number of adds submitted by participants reported in section 4.1 since some government submissions were rejected because of insufficient or incorrect address information.

¹¹The percentage increase in adds for each state presented in Appendix C reflects the number of addresses added (excluding those that were added again as described in Limits section 3.3) divided by the number of addresses already on the MAF.

following characteristics:

- The clustering of adds in collection blocks (4.2.1)
- The type of address information currently reflected on the MAF for the adds (4.2.2)
- The number of units at the basic street address where the add is located (4.2.3)
- The type of enumeration area where the add is currently located (4.2.4)
- Whether the block code for the add that was provided by the LUCA 98 program is the same as the current official block (4.2.5)
- The sources that originally placed the add on the address list (4.2.6)
- The number of adds that were delivered to the DMAF (4.2.7)
- The number of adds in the final census (4.2.8)
- The results of the adds sent to Block Canvassing and Field Verification (4.2.9)
- The total number of census addresses that were only added by LUCA 98 governmental units (4.2.10)

4.2.1 Clustering of Adds

There are 3,801,560 blocks in enumeration areas appropriate for LUCA 98. Approximately 72 percent of those blocks (2,730,913 total blocks) had at least one address on the list sent to LUCA 98 participants *or* an address updated (added, deleted, declared nonresidential, or corrected) by a LUCA participant. A total of 497,022 blocks had at least one unit added by LUCA 98 participants.

LUCA 98 participants added 5,302,094 addresses to the MAF in 497,022 blocks in TEAs 1, 6, 7, and 8. The blocks represent about 18 percent of the blocks in the LUCA 98 participant universe and 13 percent of the 3,801,560 blocks in TEAs eligible for LUCA 98. Table 5 shows the total number of blocks (in TEAs 1, 6, 7, and 8) with adds and the distribution of blocks by the number of adds.

Table 5. LUCA 98 adds in collection blocks

Number of adds	Number of blocks	Percent of total
1	170,948	34.39
2-9	227,071	45.69
10-19	50,201	10.10
20-59	35,885	7.22
60-99	6,067	1.22
100+	6,850	1.38
Total blocks with adds	497,022	100.00

* This table is based on collection geography. See the Methods Section 2.3 for more details.

** Adds were limited to those in TEAs eligible for LUCA 98. For a distribution of adds by TEA, see section 4.2.4.

The majority of blocks with adds had less than ten adds. About 34 percent of blocks with adds had just a single add, and about 46 percent of blocks had between two and nine adds.

4.2.2 Type of address information

We classified addresses into different categories indicating whether they had complete city-style address information, complete rural route information, complete P.O. box information, or had incomplete or missing address information on the MAF. We also considered whether they had a location description. See the Methods section 2.7 for more details. Table 6 shows the distribution of LUCA 98 participant adds by their type of address information.

Table 6. LUCA 98 adds by type of address

Type of Address Information	Number of adds	Percent of total*
Complete City-style	5,294,863	99.86
With location description	51,237	0.97
Without location description	5,243,626	98.90
Complete Rural Route	789	0.01
With location description	85	<0.01
Without location description	704	0.01
Complete P.O. Box	1,906	0.04
With location description	29	<0.01
Without location description	1,877	0.04
Incomplete address information	4,534	0.09
With location description	2,850	0.06
Without location description	1,684	0.03
No address information	2	<0.01
With location description	0	0.00
Without location description	2	<0.01
Total adds	5,302,094	100.00

Over 99 percent of the units that LUCA 98 field representatives added had city-style address information. The number of LUCA 98 adds with non-city-style address information (Rural Route) is very low at 0.01 percent. This result is not surprising given the LUCA 98 program was conducted in areas the Census Bureau identified as having predominantly city-style addresses and in these areas the Census 2000 address list was initially created using addresses obtained from the U.S. Postal Service. However, not all housing units receive mail at city-style addresses. We do not have a way to compute the percentage of adds with city-style addresses used for mail delivery.

The biggest concern for LUCA 98 adds are units that have non-city style or incomplete address information and have no location description information. Without this information, these units would have been difficult to locate in subsequent operations. However, as seen in Table 6, there

are a small percentage of adds (less than 0.1 percent) in this situation.

Over 98 percent of the LUCA 98 adds in every state had city-style address information. Massachusetts and New Jersey had the lowest percentage of adds with city-style address information with 98.8 percent and 98.6 percent, respectively.

4.2.3 Size of basic street address

The size of basic street address is the number of units located at a basic street address. This variable was created on the MAF for units with city-style address information. Housing units with non-city-style addresses are considered single units. Table 7 shows the LUCA 98 adds by the number of units at the basic street address.

Table 7. LUCA 98 adds by size of basic street address

Size of BSA	Number of adds	Percent of total*
Single unit	3,416,930	64.44
Multi unit	1,885,164	35.56
2-4 units	654,925	12.35
5-9 units	254,162	4.79
10-19 units	184,920	3.49
20-49 units	196,828	3.71
50+ units	594,329	11.21
Total adds	5,302,094	100.00

*Subgroup percentages for multi-units do not sum to 35.56 due to rounding

Single units accounted for about 64 percent of the total LUCA 98 adds. The remaining 36 percent were in multi-unit structures. Most of the adds in multi-units were either in very small multi-units (2-4 units) or very large multi-units (over 50 units).

In most states, single units accounted for at least half of the LUCA 98 adds (see Appendix D). There were four states with over 50 percent of adds in multi-unit structures: Arizona (60 percent), District of Columbia (63 percent), Illinois (74 percent), and New York (85 percent). The majority of the adds in Arizona and Illinois were in 50+ unit structures. There was a total of 812 adds in DC and about 47 percent of them were in 50 or more unit structures, signifying that the government may have added one or more large apartment buildings. The majority of adds in New York were in 2-4 unit structures.

4.2.4 Type of enumeration area

As previously mentioned, the LUCA 98 program occurred in the following TEAs: Mailout/Mailback, Military, Urban Update/Leave, and Urban Update/Enumerate. These TEAs are “appropriate” for the LUCA 98 program. Addresses that did not have a TEA designation on the MAF represent addresses where GEO could not determine its exact block location (referred to as an “ungeocoded address”). Table 8 shows the adds from the LUCA 98 participants by the type of enumeration area.

Table 8. LUCA 98 adds by type of enumeration area

Type of enumeration area	Number of adds	Percent of total
TEAs <i>inappropriate</i> for the operation (TEAs 2, 3, 5, and 9)	146,601	2.76
TEAs <i>appropriate</i> for the operation (TEAs 1, 6, 7, and 8)	4,952,163	93.40
Mailout/Mailback	4,933,267	93.04
Military	3	0.01
Urban Update/Leave	16,013	0.30
Urban Update/Enumerate	2,880	0.05
TEA unknown (ungeocoded addresses)	203,330	3.83
Total adds	5,302,094	99.99

* Percentages do not sum to 100.00 due to rounding

Most LUCA 98 adds were in TEAs appropriate for the operation. The Mailout/Mailback enumeration area had the largest number of adds by far with 93 percent. The adds in TEAs inappropriate for the operation were likely added erroneously by LUCA 98 participating governments or may have been subject to TEA changes after the government added the unit.

The states with the smallest percentage of adds in the appropriate TEAs were Arkansas (46 percent) and Oklahoma (50 percent). About 19 percent of the adds in Oklahoma were ungeocoded and 31 percent were in Update/Leave areas. About 52 percent of the adds in Arkansas were in Update/Leave areas.

Arizona, South Dakota, and West Virginia were the only other states with less than 80 percent of adds in the appropriate TEAs. Arizona had a high percentage of ungeocoded adds (35 percent). The other adds in South Dakota and West Virginia were mostly in Update/Leave areas. For more state level information see Appendix E.

4.2.5 Block code agreement

LUCA 98 participating governments were required to provide a block code for adds they submitted. Other Census operations provided block codes for addresses on the MAF as of November 2000. When two or more operations provided different block codes for a particular

address, the Census Bureau used a scoring hierarchy to determine the official block. Table 9 shows the extent that the block code for the add provided by the LUCA 98 participant agreed with the official block.

Table 9. LUCA 98 adds by official block code agreement

The LUCA 98 block code is...	Number of adds	Percent of total
LUCA 98 did not provide a block code	1,160,798	21.81
Different than the official block	559,456	10.51
Same as the official block	3,603,050	67.68
Total adds*	5,323,304	100.00

* We used the November 2000 MAF extract file (rather than the March 2001 MAF extract file) to create this statistic, so the number of adds does not match other tables due to the merging of addresses described in section 3.6.

More than two thirds of the LUCA 98 adds have a block code that is the same as the official block. This indicates that the LUCA 98 block usually agreed with other operations that provided a block code, or LUCA 98 was the only operation that provided a block code for that address.

Approximately 11 percent of LUCA 98 adds had block codes that were different from the official block. These may have been situations where:

- The block provided by the participating government disagreed with the block code provided by another operation that occurred after LUCA 98 or had more leverage in the scoring hierarchy.
- The LUCA 98 participant may have unknowingly assigned the unit to the wrong block.

The state level percentages of adds that had block codes that were different from the official block ranged from one percent in Alaska to approximately 44 percent in West Virginia. See Appendix F for state level statistics.

4.2.6 *Original Source*

The operation that is identified as the original source of an address is the one that we believe first placed the address on the MAF, given the address in a TEA appropriate for the operation. See section 2.5 for more details on how we defined original source. Table 10 shows the LUCA 98 participant adds by original source categories.

Table 10. LUCA 98 adds by original source category

Original source	Number of adds	Percent of total
Pre-LUCA 98*	1,600,887	30.19
LUCA 98	2,615,296	49.33
LUCA 98 and Block Canvassing	568,939	10.73
LUCA 98 and the September '98 DSF	410,868	7.75
Some other source	106,104	2.00
Total adds	5,302,094	100.00

*The Pre-LUCA original source categories for the adds include the 1990 ACF, Census 2000 Dress Rehearsal, DSF (November '97 and September '98), and Block Canvassing.

Nearly 68 percent of adds have an original source of LUCA 98 or LUCA 98 combined with another operation that occurred at the same time. The Census Bureau may have made updates to the MAF from the September 1998 USPS DSF file or from the Block Canvassing operation before or after LUCA 98 updates were made. Since it was difficult for us to identify which operation occurred first, both operations were given credit as the original source for the added unit.

Hawaii and Illinois had by far the highest percentage adds that had an original source of LUCA 98 only with approximately 96 percent and 82 percent of adds, respectively.

Those adds that have an original source of an operation that occurred before LUCA 98 were on the MAF before the LUCA 98 program but were either:

- not assigned to a block or
- considered non-residential prior to being added by this operation.

The two percent of addresses that have an original source from “some other source” reflect rare situations where the operation added units outside its boundaries, or areas that had boundary changes subsequent to the operation.

Arkansas had the highest percent of adds (36 percent) with some other original source. West Virginia (30 percent), Oklahoma (23 percent) and South Dakota (23 percent) were the states with the next highest percentages.

4.2.7 DMAF deliverability of adds

The DMAF is the file used for the delivery of census forms to respondents. An address on the MAF was DMAF deliverable if it was adequate to include in the census enumeration. The rules for determining the DMAF deliverability of an address were relatively complex. In general, the DMAF included MAF addresses that represented potential residential units that were geocoded to census blocks.

The majority of LUCA 98 adds (with sufficient address information) were delivered to the DMAF based on the following criteria:

- The Census Bureau sent the add to the Block Canvassing operation and a field representative verified that it existed.
- The Census Bureau was not able to send the add to the Block Canvassing operation, but the unit was also added in Block Canvassing.
- The add was not verified by Block Canvassing and was sent to the LUCA 98 Field Verification operation. The Census Bureau delivered these adds to the DMAF as “provisional” since the field verification operation was not scheduled to finish before the first census questionnaire mailing. As a result, the Census Bureau sent all of the LUCA 98 provisional address adds a census questionnaire.

The percentage of LUCA 98 participant adds in the nation that were DMAF deliverable on the March 2001 MAF extracts was about 95 percent.

In most states, at least 87 percent of adds were DMAF deliverable (Appendix G). However, the DMAF deliverability percent for Arizona, Oklahoma, and South Dakota were 64.5, 74.3, and 73.1 respectively. The low DMAF deliverability percentage in Arizona may be attributed to the fact that a participating government submitted a number of adds with incorrect address information (ZIP code).

4.2.8 Final Census status of adds

An address on the DMAF was assigned a status of “in the Census” if it was considered to be an existing housing unit at the end of all Census 2000 processes. Although there are errors (erroneously included or excluded units) in the final census results, we suspect the magnitude of the errors to be relatively small. Therefore, we believe we can get an indication of the quality of LUCA 98 adds by looking at their final status in the census.

There were a total of 3,062,436 LUCA 98 adds in the country that were valid housing units in the Census. This number represents about 58 percent of LUCA 98 adds. State level percentages of adds in the final census ranged from 6.92 in Hawaii to 83.7 in West Virginia (Appendix H).

LUCA 98 adds that were not valid housing units in the census may have been one of the following:

- mistakenly added by a participating government, or
- identified as a duplicate or a nonexistent address by one of the address operations that followed LUCA 98 (Block Canvassing, LUCA 98 Field Verification, etc.).

4.2.9 LUCA 98 Field Verification and Block Canvassing results

As previously stated, the Census Bureau required the verification of all LUCA 98 participant adds. The add could have been verified by Block Canvassing or LUCA 98 Field Verification. LUCA 98 adds with sufficient address information could have taken one of the following paths:

- The add was on the MAF prior to the Block Canvassing operation and it was confirmed to exist in Block Canvassing.
- The add was on the MAF prior to the Block Canvassing operation and it was deleted in Block Canvassing. The Census Bureau sent the add to the LUCA 98 Field Verification to confirm the Block Canvassing delete.
- The add was not on the MAF prior to the Block Canvassing operation. However, a field representative in Block Canvassing also added the address, therefore confirming the existence of the LUCA 98 add.
- The add was not on the MAF prior to the Block Canvassing operation and a field representative in Block Canvassing did not add the address. The Census Bureau sent the add to the LUCA 98 Field Verification operation.
- There are other anomalies that may have occurred in the validation of LUCA updates. Supplemental LUCA updates were made after Block Canvassing and were not sent to Field Verification due to timing constraints.

Due to the complexity of the different validation paths and the interpretation of those paths without the knowledge of the specific addresses that were in the Supplemental LUCA universe, we chose to simplify the presentation of results. We present the results the LUCA adds by the last operation (Block Canvassing or LUCA 98 Field Verification) that could have confirmed its existence before subsequent Census operations occurred. Results are presented by the following groups:

- The add was confirmed to exist as a residential housing unit in the Block Canvassing operation. These LUCA adds did not go to the LUCA 98 Field Verification operation.
- The add was deleted in the Block Canvassing operation and not sent to the LUCA 98 Field Verification operation. These cases may reflect situations where the address appeared as nonresidential on some other source, so there was no need for a confirmation of the Block Canvassing delete in LUCA 98 Field Verification.
- The add was confirmed to exist as a residential housing unit in Field Verification. The add may have been in Block Canvassing but it was sent be verified again in the Field

Verification operation.

- The add was deleted in Field Verification. Some of these adds may have also been in the Block Canvassing operation. If Block Canvassing also deleted the add, then it was no longer eligible for Census processing (since two different sources deleted it).
- The add was not included in the Block Canvassing nor the Field Verification operation. These may reflect Supplemental LUCA cases.

Table 11 shows LUCA 98 participant adds and their result in the last operation (Block Canvassing or LUCA 98 Field Verification) that was to confirm its existence.

Table 11. LUCA 98 participant adds in Block Canvassing and Field Verification

Action in Block Canvassing or Field Verification	Number of LUCA 98 adds	Percent of total*
Confirmed in Block Canvassing (added, verified, corrected)	1,962,503	37.01
Deleted in Block Canvassing and not sent to Field Verification	1,212	0.02
Confirmed in Field Verification (verified or corrected)	1,095,782	20.67
Deleted in Field Verification	1,672,382	31.54
Not in Block Canvassing nor in Field Verification operations	570,215	10.75
Total LUCA 98 adds	5,302,094	99.99

* Percentages do not sum to 100.00 due to rounding.

Approximately 58 percent of LUCA 98 participant adds were confirmed to exist by Block Canvassing operation (37 percent) or the LUCA 98 Field Verification operation (21 percent). The confirmation of the add at this point in the Census process does not imply that the add was on the final census address list. There were operations that followed, such as the Coverage Improvement Followup or the Nonresponse Followup, that may have determined the housing unit did not exist as a residential unit as of census day.

About 32 percent of LUCA 98 adds were deleted in the LUCA 98 Field Verification operation. Some of the adds deleted in Field Verification were also deleted in the Block Canvassing operation, therefore the address was ineligible for further census processing (since Field Verification confirmed that the address did not exist as a residential unit). The others continued in the census process unless another coverage improvement operation determined it did not exist.

The 11 percent of LUCA 98 adds that were not included in either the Block Canvassing or the LUCA 98 Field Verification operations may represent units that were added in Supplemental LUCA. Due to the late processing of these LUCA 98 results the Census Bureau decided to eliminate the verification process for Supplemental LUCA 98 updates.

4.2.10 Census addresses that were only added by LUCA 98 governmental units

As previously mentioned, there are 3,062,436 LUCA 98 adds in the nation that were valid housing units in the Census. The majority of these adds may have also come from other address building operations such as the Block Canvassing operation or the USPS's DSF. To get a measure of the number of valid census housing units that would have only been on the census address list at the time of enumeration because it was a LUCA 98 program add, we used the following criteria:

- The LUCA 98 add is currently in a TEA appropriate for LUCA 98 (TEAs 1, 6, 7, and 8).
- The LUCA 98 add was not on the 1990 Address Control File or in the Census 2000 Dress Rehearsal.
- The LUCA 98 add was not residential on the USPS's DSF deliveries used to update the census address list in November of 1997 and September of 1998.
- The LUCA 98 add was not added in the Block Canvassing operation.
- The LUCA 98 add was on the March 2001 extracts and was a valid unit in the final census.

There were a total of 675,627 LUCA 98 adds with the criteria described above. This number may be an overestimate since some LUCA 98 adds were sent to the Block Canvassing operation and verified to exist by a field representative. There is no way to determine if the Block Canvassing field representative would have also added the address if it had not been on their list.

The Census Bureau also updated the census address list with the November 1999 DSF after the Block Canvassing and LUCA 98 operations. The Bureau mailed questionnaires to geocoded residential addresses reflected on this DSF. A total of 161,091 of the LUCA 98 adds described above were on this DSF as residential. The remaining 514,536 LUCA 98 adds were:

- not on the November 1999 DSF,
- on the November 1999 DSF as "commercial", or
- on the November 1999 DSF as an "X" record¹²

Considering the November 1999 DSF, we feel that 514,536 addresses is the best estimate of census addresses that would not have been on the census address list at the time of enumeration if not for the LUCA 98 program.

¹² An address with a DSF delivery type of "X" is not classified as residential or commercial. These are often units that are not yet receiving mail, but could receive it in the future. The Census Bureau did not attempt to mail to these "X" records unless some other address updating operation also provided it.

Later census operations, such as the Nonresponse Follow-up and the Coverage Improvement Follow-up, also updated the address list. **Considering adds from these later operations, we feel that 505,530 addresses is the best estimate of the number of addresses in Census 2000 that were solely provided by LUCA 98.** About 31.4 percent of these addresses were provided by local governments in New York. For state level data, see Appendix K.

In a census environment, it is ideal to have the most complete address list at the start of the enumeration. The sooner we can get new construction onto the address list, the more likely that we will obtain an accurate enumeration. So, although the number of adds for which we give credit to the LUCA program diminishes as we bring in the results of later operations, the fact that we were able to obtain these addresses from local governments earlier in the process helped ensure a more complete census.

4.3 How many addresses did LUCA 98 participants delete from the MAF and what are their characteristics?

For the purpose of this evaluation, all addresses that participating governments identified as “delete” or “nonresidential” in the LUCA 98 program will be characterized as deletes in this section. LUCA 98 governments deleted a total of 490,613 addresses. There were:

- 465,817 deleted addresses, and
- 24,796 addresses declared nonresidential

The 490,613 deletes represent 0.6 percent of the addresses sent to LUCA 98 participants to review (81,537,188 total addresses).

The state level percentage of addresses in the initial universe that were deleted ranged from none in the District of Columbia to approximately 3 percent in Maine. For the percentage of addresses deleted and determined nonresidential from the initial universe by state, refer to Appendix A.¹³

We profile the LUCA 98 deletes for the nation in the sections that follow. The profile will include the following characteristics:

- The clustering of deletes in collection blocks (4.3.1)
- The type of address information currently reflected on the MAF (4.3.2)
- The number of units at the basic street address where the delete is located (4.3.3)
- The type of enumeration area the delete is currently located (4.3.4)
- The sources that originally placed the delete on the address list (4.3.5)
- The number of deletes that were delivered to the DMAF (4.3.6)

¹³ The delete and nonresidential columns in Appendix A reflect the percent of addresses that governments deleted from the Census address list they reviewed. Those percentages are presented for each state. For a distribution of the total number of deletes by state, refer to Appendix I.

- The number of deletes in the final census (4.3.7)
- LUCA 98 Field Verification and Block Canvassing results (4.3.8)

4.3.1 Clustering of deletes

As mentioned in section 4.2.1, there are 3,801,560 blocks in enumeration areas appropriate for LUCA 98. Approximately 72 percent of those blocks (2,730,913 total blocks) had at least one address on the list sent to LUCA 98 participants or an address updated (added, deleted, declared nonresidential, or corrected) by a LUCA participant. A total of 130,640 of those blocks had at least one unit deleted by a LUCA 98 participant.

LUCA 98 participants deleted 490,613 addresses in 130,640 blocks in TEAs 1, 6, 7 and 8. The blocks represent about 5 percent of the blocks in LUCA 98 and about 3 percent of the 3,801,560 blocks in TEAs eligible for LUCA 98. Table 12 shows the total number of blocks (in TEAs 1, 6, 7 and 8) with deletes and the distribution of blocks by the number of deletes.

Table 12. LUCA 98 range of deletes in collection blocks*

Number of deletes	Number of blocks with this many deletes**	Percent of total blocks with deletes
1	66,920	51.22
2-9	55,426	42.43
10-19	5,254	4.02
20-59	2,378	1.82
60-99	344	0.26
100+	318	0.25
Total blocks with deletes	130,640	100.00

*This table is based on collection geography. See Methods Section 2.3 for more details

** Deletes were limited to those in TEAs eligible for LUCA 98. For a distribution of deletes by TEA, see Results Section 4.3.4.

More than half of the blocks with deletes had only one delete. Almost 94 percent of the blocks had fewer than 10 units deleted.

4.3.2 Type of address information

Table 13 presents data for the type of address information for LUCA 98 deletes. See Methods section 2.7 for more information about the address types.

Table 13. LUCA 98 deletes by type of address

Type of Address Information*	Number of deletes	Percent of total**
Complete City-style	490,293	99.93
With location description	903	0.18
Without location description	489,390	99.75
Complete Rural Route	5	<0.01
Complete P.O. Box	1	<0.01
Incomplete address information	314	0.06
No address information	0	0.00
Total deletes	490,613	99.99

* Where subcategories for location are not provided, all addresses in the category had location description information.

** Percentages do not sum to 100.00 due to rounding.

Over 99 percent of the deletes had city-style address information. This result is reflective of the fact that LUCA 98 was conducted in areas that the Census Bureau had designated as having city-style addresses. Very few addresses that participants deleted did not have complete city-style address information. City-style addresses are generally easier to identify and locate, so LUCA 98 participants may have had an easier time determining the existence of an address if they searched on the ground.

4.3.3 Size of basic street address

Table 14 shows the range of units indicated on the MAF at the basic street address of the LUCA 98 deletes.

Table 14. LUCA 98 deletes by size of basic street address

Size of BSA	Number of deletes	Percent of total
Single unit	293,266	59.78
Multi unit	197,347	40.22
2-4 units	73,687	15.02
5-9 units	27,554	5.62
10-19 units	21,038	4.29
20-49 units	23,036	4.70
50+ units	52,032	10.61
Total deletes	490,613	100.00

* Subgroup percentages for multi units do not sum to 40.22 due to rounding.

Single unit structures accounted for nearly 60 percent of LUCA 98 deletes. The state level percentages range from approximately 10 percent in Hawaii to 78 percent in West Virginia. The

broad range of this statistic from state to state may be indicative of the fact that:

- Some states have very few multi-unit structures,
- Some states had very few LUCA 98 deletes overall, or
- LUCA 98 participants in some states may have chosen to focus on units in multi-unit structures.

About 40 percent of LUCA 98 deletes were in multi-unit structures. Some of the deletes in multi-unit structures are attributed to entire multi-units that participants deleted (due to multi-units that no longer exist, etc.). Other deletes are individual units that participants deleted from a multi-unit when they believed there was an overstatement of the number of units in the structure. We do not have information to determine the magnitude of these situations relative to one another.

Some states had a high percentage of deletes in multi-unit structures. Over 90 percent of deletes in Hawaii were in multi-unit structures. However, Hawaii is one of the states with very few deletes (See Appendix I for deletes by state). Delaware is another state worth noting with almost 39 percent of deletes in large (50 or more) multi-unit structures.

4.3.4 Type of enumeration area

As previously mentioned, the LUCA 98 program occurred in the following types of enumeration areas: Mailout/Mailback, Military, Urban Update/Leave, and Urban Update/Enumerate. Table 15 shows the deletes from the LUCA 98 participants by the type of enumeration area.

Table 15. LUCA 98 deletes by type of enumeration area

Type of enumeration area	Number of deletes	Percent of total
TEAs <i>inappropriate</i> for the operation	5,146	1.05
TEAs <i>appropriate</i> for the operation	485,467	98.95
Mailout/Mailback	483,236	98.50
Military	186	0.04
Urban Update/Leave	798	0.16
Urban Update/Enumerate	1,247	0.25
TEA unknown (ungeocoded addresses)	0	0.00
Total deletes	490,613	100.00

The majority of LUCA 98 deletes were in the TEAs appropriate for the operation. The Mailout/Mailback enumeration area had the highest workload for deletes by far than any other enumeration area. This result is slightly higher than the percentage of LUCA 98 adds that were in the appropriate enumeration area (stated in section 4.2.4).

Vermont had the highest number of deletes by far that were in inappropriate TEAs (53 percent of

79 total deletes). South Carolina had the next highest percentage with about 11 percent of deletes in inappropriate TEAs.

4.3.5 Original source

Table 16 shows the distribution of LUCA 98 deletes by the address source we believe originally put the address on the MAF.

Table 16. LUCA 98 deletes by original source category

Original source	Number of deletes	Percent of total
Pre-LUCA 98	487,614	99.39
1990 ACF	400,806	81.69
Dress Rehearsal	96	0.02
November '97 DSF	81,312	16.57
Block Canvassing	3,962	0.81
September '98 DSF	1,438	0.29
Some other source	2,997	0.61
Unknown	2	0.00
Total deletes	490,613	100

The majority (82 percent) of LUCA 98 participant deletes were addresses provided by the 1990 ACF. The 1990 ACF is the oldest address source for the current MAF and represents known housing units from the 1990 Census. Given its age, it is not surprising that it was the original source for so many LUCA 98 deletes. Many housing units may have been demolished or converted in the previous 8 years.

The next largest original source category for LUCA 98 deletes was the November '97 DSF. This was the only source (other than the 1990 ACF and the Census 2000 Dress Rehearsal) that had been completely incorporated into the MAF before the first LUCA 98 participant received their address review materials. As previously mentioned, Block Canvassing and the September '98 DSF updates could have occurred before, after, or during the LUCA 98 program.

All results at the state level parallel the above results.

4.3.6 DMAF deliverability

As stated previously, the DMAF is the file used for the delivery of census questionnaires. In general, the DMAF included MAF addresses that represented potential residential units that were geocoded to census blocks.

The exclusion criteria for the initial creation of the DMAF required a second confirmation of

deletes in order to exclude an address from further processing in the census address universe. Therefore, LUCA 98 participant deletes that were confirmed as deletes by the Block Canvassing operation were not delivered to the DMAF. However, because of the timing of Block Canvassing and the LUCA 1998 Field Verification, some LUCA 98 deletes may have been delivered to the initial DMAF before a second operation could confirm the delete.

The percentage of LUCA 98 deletes that were DMAF deliverable on the March 2001 MAF extracts was 41.2 percent. The state level percentages of DMAF deliverable LUCA 98 deletes ranged from about 10 percent in Hawaii to 76 percent in Vermont.

4.3.7 Final census status of deletes

An address on the DMAF was assigned a status of “in the census” if it was considered to be an existing housing unit at the end of all Census 2000 processes. Although there are errors (erroneously included or excluded units) in the census results, we suspect the magnitude of the errors to be relatively small. Therefore, we believe we can get an indication of the quality of LUCA 98 participant deletes by looking at their final status in the census.

The percentage of LUCA 98 deletes that were enumerated as housing units in the census was about 30 percent. A few states had a percentage of deletes in the final census that was much higher than the result for the nation. About 70 percent of the deletes in New Mexico and 63 percent of the deletes in Oregon were in the final census. These deletes were likely included in the census due to one of the following reasons:

- They were erroneously deleted by the LUCA 98 participant
- They were correctly deleted by the LUCA 98 participant and erroneously reinstated to the census by other census housing unit coverage operations.

4.3.8 LUCA 98 Field Verification and Block Canvassing results

In general, LUCA 98 deletes were not required to be sent to LUCA 98 Field Verification since these addresses were already on the MAF for the Block Canvassing operation. However, some were sent to Field Verification to deal with inconsistencies.

Table 17 shows LUCA 98 participant deletes and their result in the last operation (Block Canvassing or LUCA 98 Field Verification) that had the opportunity to confirm its existence.

Table 17. LUCA 98 participant deletes in Block Canvassing and Field Verification

Action in Block Canvassing or Field Verification	Number of LUCA 98 deletes	Percent of total*
Confirmed in Block Canvassing (added, verified, corrected)	191,742	39.08
Deleted in Block Canvassing and not sent to Field Verification	211,473	43.10
Confirmed in Field Verification (verified or corrected)	1,273	0.26
Deleted in Field Verification	2,647	0.53
Not in Block Canvassing or in Field Verification	83,478	17.02
Total LUCA 98 deletes	490,613	99.99

* Percentages do not sum to 100.00 due to rounding.

Block Canvassing field representatives confirmed that about 39 percent of LUCA 98 deletes existed as residential units.

About 43 percent of LUCA deletes were also deleted in the Block Canvassing operation. Another 0.5 percent of LUCA deletes were deleted in the LUCA 98 Field Verification. Since these addresses were deleted more than once, they were not eligible for further processing in the Census. However, a later operation may have resurrected the address.

4.4 How many addresses did LUCA 98 participants correct on the MAF and what are their characteristics?

LUCA 98 participants corrected a total of 2,762,050 addresses on their lists. These corrections included:

- changes to the house number,
- changes to any component of the street name,
- changes to the unit designation, or
- geographic changes (ZIP or block code).

The 2,762,050 corrections represents about 3.4 percent of the addresses sent to LUCA 98 participants to review (81,537,188 total addresses). The percent of addresses corrected in each state ranged from zero in the District of Columbia to 16 percent in Utah. See Appendix A for percent of the initial LUCA 98 universe corrected by state. See Appendix J for the distribution of corrections by state.

This section profiles the LUCA 98 participant corrections overall. The profile includes the following characteristics:

- The clustering of corrections in collection blocks (4.4.1)
- The number of units at the basic street address where the correction is located (4.4.2)
- The sources that originally placed the correction on the address list (4.4.3)
- LUCA 98 Field Verification and Block Canvassing results (4.4.4)

4.4.1 Clustering of corrections

There are 3,801,560 blocks in enumeration areas appropriate for LUCA 98. Approximately 72 percent of those blocks (2,730,913 total blocks) had at least one address on the list sent to LUCA 98 participants or an address updated (added, deleted, declared nonresidential, or corrected) by a LUCA participant. A total of 177,412 blocks had at least one unit corrected by LUCA 98 participants.

LUCA 98 participants corrected 2,762,050 addresses on the MAF in 177,412 blocks in TEAs 1, 6, 7, and 8. The blocks represent about 6 percent of the blocks in the LUCA 98 participant universe and 5 percent of the 3,801,560 blocks in TEAs eligible for LUCA 98. Table 18 shows the total number of blocks (in TEAs 1, 6, 7, and 8) with corrections and the distribution of blocks by the number of corrections.

Table 18. LUCA 98 corrections in collection blocks

Number of corrections	Number of blocks	Percent of total
1	40,387	22.76
2-9	75,215	42.40
10-19	28,068	15.82
20-59	25,476	14.36
60-99	4,187	2.36
100+	4,079	2.30
Total blocks with corrections	177,412	100.00

* This table is based on collection geography. See the Methods Section 2.3 for more details.

** Corrections were limited to those in TEAs eligible for LUCA 98.

Like the LUCA 98 participant adds and deletes, the majority of blocks with corrections had less than 10 total corrections. However, about 16 percent of blocks did have between 10 and 19 corrected units and 14 percent had between 20 and 59 corrected units. This may indicate blocks with large multi-unit structures, since LUCA 98 address corrections often involved correcting unit designations.

4.4.2 Size of basic street address

Table 19 shows the number of corrections by the number of units at the basic street address.

Table 19. LUCA 98 corrections by size of basic street address

Size of BSA	Number of corrections	Percent of total*
Single unit	1,343,177	48.63
Multi unit	1,418,873	51.37
2-4 units	449,229	16.26
5-9 units	169,927	6.15
10-19 units	136,091	4.93
20-49 units	184,354	6.67
50+ units	479,272	17.35
Total corrections	2,762,050	100.00

* Subgroup percentages for multi units do not sum to 51.37 due to rounding.

Multi units accounted for a little over half of the LUCA 98 participant corrections. The high percentage of multi unit corrections may be an indication that LUCA participants attempted to correct unit designations. Collecting the correct unit designations for very small or very large multi unit structures can often be problematic.

States with large urban areas tended to have higher rates of corrections in multi units. About 84 percent of the corrections in New York were in multi unit structures. The state of Maine had one of the highest percentages of corrections in large (50+) multi unit structures.

4.4.3 Original Source

Table 20 shows the number of LUCA 98 corrections by the source that originally put them on the MAF. For more details on original source see section 2.5.

Table 20. LUCA 98 corrections by original source category

Original source	Number of corrections	Percent of total
Pre-LUCA 98	2,759,050	99.89
1990 ACF	2,365,307	85.64
Dress Rehearsal	95	<0.01
November '97 DSF	374,630	13.56
Block Canvassing	1,207	0.04
September '98 DSF	7,414	0.27
Some other source	2,995	0.11
Unknown	5	<0.01
Total corrections	2,762,050	100.00

Like the LUCA 98 deletes, the majority of LUCA 98 corrections (86 percent) were made to addresses from the 1990 ACF. The 1990 ACF is the oldest address source for addresses on the current MAF. Given its age, the necessity for address corrections is not surprising.

The next largest original source category for LUCA 98 corrections was the November '97 DSF. This was the only MAF source (other than the 1990 ACF and the Census 2000 Dress Rehearsal) that had been completely incorporated into the MAF before the first LUCA 98 participant received their address review materials. This may have contributed to the amount of corrections we see for this source versus the other pre-LUCA 98 sources.

State level results for this statistic mirror the results for the country. That is, the majority of corrections had an original source of the 1990 ACF or the November '97 DSF.

4.4.4 LUCA 98 Field Verification and Block Canvassing results

In general, LUCA 98 corrections were required to be sent to LUCA 98 Field Verification when the Block Canvassing results for the address did not agree with the LUCA correction.

Table 21 shows LUCA 98 participant corrections and their result in the last operation (Block Canvassing or LUCA 98 Field Verification) that had the opportunity to confirm its existence.

Table 21. LUCA 98 participant corrections in Block Canvassing and Field Verification

Action in Block Canvassing or Field Verification	Number of LUCA 98 corrections	Percent of total
Confirmed in Block Canvassing (added, verified, corrected)	2,402,426	86.98
Deleted in Block Canvassing and not sent to Field Verification	27,235	0.99
Confirmed in Field Verification (verified or corrected)	208,602	7.55
Deleted in Field Verification	109,720	3.97
Not in Block Canvassing or in Field Verification	14,067	0.51
Total LUCA 98 deletes	2,762,050	100.00

Approximately 87 percent of LUCA 98 corrections were confirmed to exist in Block Canvassing and not included in the Field Verification operation. Block Canvassing field representatives corrected either the address information or block information for about 12 percent of LUCA corrections. They verified about 73 percent. The Census Bureau likely did not send these addresses to the Field Verification operation for one of the following reasons:

- The correction made by Block Canvassing did not conflict with the corrected information provided by the LUCA 98 participant.
- The LUCA 98 participants corrected information was included on the MAF prior to Block Canvassing and Block Canvassing served as the verification.
- The participant was part of the Supplemental LUCA 98 program and the Census Bureau decided not to field verify those updates due to time constraints.

The next largest group of LUCA 98 corrections were confirmed in LUCA 98 Field Verification (about 8 percent). Most of them (5 percent) were verified to exist as is rather than corrected again.

4.5 How many addresses did participants appeal and how many of them were in the final census?

LUCA 98 governments appealed a total of 313,853 addresses. A total of 303,410 of those addresses were added to the MAF after approval by the Census Address List Appeals Office established by the Office of Management and Budget. There were 141,580 appeals addresses that were included on the final census address list.

4.6 What is the overall assessment of the LUCA 98 program?

The address list for the LUCA 98 program included addresses from various MAF sources, including the 1990 ACF, two DSF deliveries, and the Block Canvassing operation. There were approximately 81.5 million addresses from these sources on the MAF that were eligible for review in LUCA 98. LUCA 98 participants received the portion of these addresses that were in their jurisdiction and made updates.

About 53 percent of the 17,424 eligible local and tribal governments participated in the LUCA 98 program. The participating governments received review materials for addresses in their jurisdiction. The total number of addresses that were sent to be reviewed by participants represented about 92 percent of the housing units in the LUCA 98 eligible areas. Although the governments that agreed to participate covered a large area, only 36 percent of participating governments made address updates. **We recommend that the Census Bureau investigate ways to increase government participation. Especially focusing on ways to aid the governmental unit in providing updates once they have agreed to participate.**

There were approximately 3.8 million blocks in enumeration areas appropriate for LUCA 98 and about 2.7 million blocks were reviewed by participating governments. Participating governments made address updates (adds, corrections, and deletes) in 664,189 blocks. Of the 2.7 million blocks participants reviewed, about 18 percent yielded at least one add, 5 percent yielded at least one delete, and 6 percent yielded at least one correction.

The LUCA 98 program contributed to the address list in many areas. Participants added 5,302,094 addresses, deleted 490,613 addresses, and corrected 2,762,050 addresses on the MAF. About 58 percent of LUCA 98 adds were on the final census housing unit inventory.

Although the updates had a large impact on the update of the Master Address File for Census 2000, the timing of the program with other Census 2000 address updating operations introduced some complexity in determining the true impact of updates to the final census results. However, we do estimate that about 505,530 addresses in the final census were provided by Local Update of Census Addresses participants and may not have been provided by any other census operation.

In order to understand the true impact of LUCA in the future, we recommend that the Census Bureau allow sufficient time for the completion of government updates prior to Block Canvassing activities. This would reduce the complexity of processing, as well as eliminate the need for another operation to validate updates.

Acknowledgments

The author would like to thank Annette M. Quinlan of the Decennial Management Division for her help with the analysis of LUCA participants, as well as help with applying the quality assurance procedures for this report.

References

Anteon Corporation, *Results of the Survey of Selected Governments Eligible for the Local Update of Census Addresses (LUCA) Program*, U.S. Department of Commerce, March 29, 2002.

Bates, Lawrence <Lbates@geo.census.gov>, "Re: GRFC Files," April 19, 2001, office communication.

Bates, Lawrence <Lbates@geo.census.gov>, "Re: LUCA 98 Block Flag Problem," September 20, 2001, office communication.

Bureau of the Census, "Chapter 2. Address List Development," *Programs to Improve Coverage in the 1990 Census*, U.S. Government Printing Office, Washington, D.C., 1993.

"Census 2000 Type of Enumeration Areas (TEAs)," *Geography Intranet at the Bureau of the Census*, <<http://www.geo.census.gov/mob/homep/teas.html>> (May 5, 2001).

"Collection 2000 State Tally Update Leave Blocks by TEA," *Geography Intranet at the Bureau of the Census*, October 24, 2001, <http://www.geo.census.gov/gasb/collection/ul/total_colblkultea.html> (October 24, 2001)

Howard, L. and Vitrano, F., *An Evaluation of the Master Address File Building Process*, Census 2000 Dress Rehearsal Evaluation Results Memorandum No. B2., June, 1999.

Hogan, Howard, *Specification of the Decennial Master Address File Deliverability Criteria for Census 2000*, DSSD Census 2000 Procedures and Operations Memorandum Series #D-1, June 30, 1999.

"MAF Extract Layout," *Geography Intranet at the Bureau of the Census*, April 18, 2001, <<http://www.geo.census.gov/tsb/mafextract/MAFXlayout.html>> (October 9, 2001).

Medina, Karen S., *Program Master Plan: Census 2000 1999 Address List Review Program*, Census 2000 Informational Memorandum No. 33, Bureau of the Census, June 23, 1999.

Miskura, M. Susan, *Program Master Plan: Census 2000 1998 Address List Review Program*, Census 2000 Informational Memorandum No. 32, Bureau of the Census, November 23, 1999.

Owens, Karen., Data Requirements for the Census 2000 LUCA Evaluations, Planning Research, and Evaluation Division TXE/2010 Memorandum Series: MAF-LUC-01, Bureau of the Census, November 20, 2000.

Owens, Karen., *Evaluation of the Local Update of Census Addresses 1999 (LUCA 99)*, Census 2000 Evaluation Memorandum No. F.6., Bureau of the Census, May 14, 2002.

Ruhnke, Megan C. <Megan.C.Ruhnke@census.gov>, "Notes from meeting with GEO about tab/collection geography," March 27, 2001, office communication.

Stark, Billy, *Supplemental Local Update of Census Addresses (LUCA) 1998 Products Specifications*, Bureau of the Census, July 9, 1999.

Van Horn, Carol M., *Program Master Plan: Census 2000 Master Address File*, Census 2000 Informational Memorandum No. 102, Bureau of the Census, May 1, 2001.

Vitrano, Frank A., *Determining Address Classification for Master Address File (MAF) Evaluation Purposes*, Planning, Research, and Evaluation Division TXE/2010 Memorandum Series: MAF-EXT-D-01, Bureau of the Census, September 26, 2001.

Vitrano, Frank A., *Determining Original Source for the November 2000 Master Address File for Evaluation Purposes*, Planning, Research, and Evaluation Division TXE/2010 Memorandum Series: MAF-EXT-S-01, Bureau of the Census, March 5, 2001.

Westat, *Report of the Survey of Partners*, Census 2000 Evaluation Memorandum No. D.3., Bureau of the Census, May 23, 2002.

Appendix A: LUCA 98 participant actions on addresses sent

State	Addresses sent to participants	LUCA 98 participant action (percent of addresses sent)				
		No action	Added	Deleted	Determined non-residential	Corrected
Alabama	1,064,949	95.22	1.98	0.90	0.02	1.88
Alaska	147,828	98.75	0.87	0.14	0.00	0.24
Arizona	1,542,140	96.36	1.42	0.26	0.05	1.91
Arkansas	438,141	95.25	0.83	0.63	0.04	3.25
California	11,015,284	95.53	0.88	0.19	0.01	3.40
Colorado	1,222,041	96.57	1.48	0.88	0.03	1.04
Connecticut	960,535	95.16	1.26	0.87	0.02	2.69
Delaware	227,596	98.72	0.48	0.40	0.01	0.40
District of Columbia	288,215	99.99	0.01	0.00	0.00	0.00
Florida	5,811,166	96.97	1.39	0.25	0.01	1.38
Georgia	2,092,775	92.39	4.19	0.61	0.03	2.78
Hawaii	331,148	96.52	3.44	0.00	0.03	0.02
Idaho	287,299	97.03	0.90	0.37	0.03	1.67
Illinois	3,913,651	97.19	0.83	0.43	0.02	1.54
Indiana	1,665,002	96.07	2.17	0.46	0.04	1.26
Iowa	775,613	95.08	0.96	1.52	0.07	2.37
Kansas	741,332	84.99	0.73	0.63	0.04	13.61
Kentucky	736,027	96.48	0.75	0.66	0.03	2.08
Louisiana	1,240,476	95.39	3.38	0.41	0.02	0.79
Maine	84,495	95.73	0.17	2.95	0.02	1.13
Maryland	1,809,914	97.29	1.10	0.43	0.03	1.14
Massachusetts	2,125,258	96.27	0.40	0.92	0.02	2.40
Michigan	3,311,104	94.84	0.84	1.54	0.04	2.74
Minnesota	1,166,610	93.54	3.65	0.65	0.03	2.14
Mississippi	590,838	96.84	0.91	0.78	0.05	1.41
Missouri	1,498,815	96.19	2.46	0.59	0.03	0.73
Montana	97,528	98.39	0.23	0.63	0.14	0.61
Nebraska	479,458	95.12	0.62	1.01	0.04	3.21
Nevada	552,952	98.19	1.26	0.14	0.02	0.39
New Hampshire	206,896	96.24	0.51	2.37	0.03	0.85
New Jersey	2,892,249	96.17	0.66	0.83	0.04	2.30
New Mexico	393,012	94.19	4.35	0.52	0.02	0.93
New York	5,883,340	83.55	0.34	0.56	0.02	15.52
North Carolina	1,623,924	93.74	1.96	0.55	0.02	3.72
North Dakota	137,045	97.57	0.17	1.08	0.07	1.10
Ohio	3,745,338	96.23	0.46	0.37	0.03	2.92
Oklahoma	734,894	98.26	1.12	0.40	0.01	0.21
Oregon	941,177	98.10	0.79	0.52	0.01	0.59
Pennsylvania	3,970,888	96.26	1.10	0.93	0.03	1.67
Rhode Island	354,002	98.82	0.44	0.35	0.01	0.39
South Carolina	1,061,629	84.07	2.85	0.93	0.04	12.12
South Dakota	149,917	98.19	0.26	0.61	0.10	0.84
Tennessee	1,490,569	94.56	1.75	0.56	0.02	3.11
Texas	5,557,733	96.62	1.02	0.52	0.07	1.77
Utah	555,504	81.94	1.34	0.44	0.04	16.24
Vermont	40,976	98.59	0.01	0.18	0.01	1.21
Virginia	1,823,006	97.74	0.47	0.24	0.01	1.54
Washington	1,981,041	96.57	2.03	0.29	0.06	1.04
West Virginia	116,490	99.92	0.01	0.04	0.00	0.03
Wisconsin	1,545,100	94.68	0.97	1.62	0.12	2.61
Wyoming	114,268	94.86	0.36	0.99	0.05	3.74
United States	81,537,188	94.80	6.50	0.57	0.03	3.40

Appendix B: LUCA 98 participant adds by state

State	Number of adds	Percent of total
Alabama	81,345	1.53
Alaska	7,318	0.14
Arizona	233,832	4.41
Arkansas	45,538	0.86
California	562,243	10.60
Colorado	124,649	2.35
Connecticut	35,784	0.67
Delaware	4,556	0.09
District of Columbia	812	0.02
Florida	380,088	7.17
Georgia	360,675	6.80
Hawaii	55,315	1.04
Idaho	25,559	0.48
Illinois	444,557	8.38
Indiana	114,545	2.16
Iowa	42,549	0.80
Kansas	36,871	0.70
Kentucky	42,973	0.81
Louisiana	60,340	1.14
Maine	2,287	0.04
Maryland	98,401	1.86
Massachusetts	75,029	1.42
Michigan	191,014	3.60
Minnesota	70,062	1.32
Mississippi	26,410	0.50
Missouri	111,043	2.09
Montana	2,848	0.05
Nebraska	8,898	0.17
Nevada	21,065	0.40
New Hampshire	7,259	0.14
New Jersey	93,552	1.76
New Mexico	42,024	0.79
New York	507,881	9.58
North Carolina	142,209	2.68
North Dakota	3,902	0.07
Ohio	120,707	2.28
Oklahoma	38,150	0.72
Oregon	75,377	1.42
Pennsylvania	185,413	3.50
Rhode Island	13,021	0.25
South Carolina	157,838	2.98
South Dakota	9,581	0.18
Tennessee	119,230	2.25
Texas	217,454	4.10
Utah	53,846	1.02
Vermont	1,062	0.02
Virginia	72,129	1.36
Washington	84,519	1.59
West Virginia	423	0.01
Wisconsin	85,742	1.62
Wyoming	4,169	0.08
United States	5,302,094	100.00

Appendix C: LUCA 98 adds as a percentage of addresses on the initial list

State	Addresses reviewed by participants	Number of adds	Percent increase in adds
Alabama	1,064,949	81,345	7.64
Alaska	147,828	7,318	4.95
Arizona	1,542,140	233,832	15.16
Arkansas	438,141	45,538	10.39
California	11,015,284	562,243	5.10
Colorado	1,222,041	124,649	10.20
Connecticut	960,535	35,784	3.73
Delaware	227,596	4,556	2.00
District of Columbia	288,215	812	0.28
Florida	5,811,166	380,088	6.54
Georgia	2,092,775	360,675	17.23
Hawaii	331,148	55,315	16.70
Idaho	287,299	25,559	8.90
Illinois	3,913,651	444,557	11.36
Indiana	1,665,002	114,545	6.88
Iowa	775,613	42,549	5.49
Kansas	741,332	36,871	4.97
Kentucky	736,027	42,973	5.84
Louisiana	1,240,476	60,340	4.86
Maine	84,495	2,287	2.71
Maryland	1,809,914	98,401	5.44
Massachusetts	2,125,258	75,029	3.53
Michigan	3,311,104	191,014	5.77
Minnesota	1,166,610	70,062	6.01
Mississippi	590,838	26,410	4.47
Missouri	1,498,815	111,043	7.41
Montana	97,528	2,848	2.92
Nebraska	479,458	8,898	1.86
Nevada	552,952	21,065	3.81
New Hampshire	206,896	7,259	3.51
New Jersey	2,892,249	93,552	3.23
New Mexico	393,012	42,024	10.69
New York	5,883,340	507,881	8.63
North Carolina	1,623,924	142,209	8.76
North Dakota	137,045	3,902	2.85
Ohio	3,745,338	120,707	3.22
Oklahoma	734,894	38,150	5.19
Oregon	941,177	75,377	8.01
Pennsylvania	3,970,888	185,413	4.67
Rhode Island	354,002	13,021	3.68
South Carolina	1,061,629	157,838	14.87
South Dakota	149,917	9,581	6.39
Tennessee	1,490,569	119,230	8.00
Texas	5,557,733	217,454	3.91
Utah	555,504	53,846	9.69
Vermont	40,976	1,062	2.59
Virginia	1,823,006	72,129	3.96
Washington	1,981,041	84,519	4.27
West Virginia	116,490	423	0.36
Wisconsin	1,545,100	85,742	5.55
Wyoming	114,268	4,169	3.65
United States	81,537,188	5,302,094	6.50

Appendix D: LUCA 98 adds by size of basic street address

State	Number of adds	Single-Unit structures		Multi-Unit Structures	
		Number	Percent	Number	Percent
Alabama	81,345	69,230	85.11	12,115	14.89
Alaska	7,318	5,339	72.96	1,979	27.04
Arizona	233,832	95,420	40.81	138,412	59.19
Arkansas	45,538	35,286	77.49	10,252	22.51
California	562,243	394,710	70.20	167,533	29.80
Colorado	124,649	73,872	59.26	50,777	40.74
Connecticut	35,784	18,233	50.95	17,551	49.05
Delaware	4,556	3,250	71.33	1,306	28.67
District of Columbia	812	302	37.19	510	62.81
Florida	380,088	301,771	79.40	78,317	20.60
Georgia	360,675	279,488	77.49	81,187	22.51
Hawaii	55,315	39,844	72.03	15,471	27.97
Idaho	25,559	20,117	78.71	5,442	21.29
Illinois	444,557	114,726	25.81	329,831	74.19
Indiana	114,545	105,856	92.41	8,689	7.59
Iowa	42,549	32,048	75.32	10,501	24.68
Kansas	36,871	30,618	83.04	6,253	16.96
Kentucky	42,973	32,793	76.31	10,180	23.69
Louisiana	60,340	38,004	62.98	22,336	37.02
Maine	2,287	1,897	82.95	390	17.05
Maryland	98,401	70,240	71.38	28,161	28.62
Massachusetts	75,029	41,286	55.03	33,743	44.97
Michigan	191,014	145,032	75.93	45,982	24.07
Minnesota	70,062	48,721	69.54	21,341	30.46
Mississippi	26,410	19,980	75.65	6,430	24.35
Missouri	111,043	90,793	81.76	20,250	18.24
Montana	2,848	1,896	66.57	952	33.43
Nebraska	8,898	7,335	82.43	1,563	17.57
Nevada	21,065	13,404	63.63	7,661	36.37
New Hampshire	7,259	5,518	76.02	1,741	23.98
New Jersey	93,552	70,780	75.66	22,772	24.34
New Mexico	42,024	40,299	95.90	1,725	4.10
New York	507,881	76,208	15.01	431,673	84.99
North Carolina	142,209	113,495	79.81	28,714	20.19
North Dakota	3,902	2,026	51.92	1,876	48.08
Ohio	120,707	99,842	82.71	20,865	17.29
Oklahoma	38,150	34,470	90.35	3,680	9.65
Oregon	75,377	51,364	68.14	24,013	31.86
Pennsylvania	185,413	161,920	87.33	23,493	12.67
Rhode Island	13,021	11,916	91.51	1,105	8.49
South Carolina	157,838	126,258	79.99	31,580	20.01
South Dakota	9,581	6,317	65.93	3,264	34.07
Tennessee	119,230	99,961	83.84	19,269	16.16
Texas	217,454	170,081	78.21	47,373	21.79
Utah	53,846	41,346	76.79	12,500	23.21
Vermont	1,062	532	50.09	530	49.91
Virginia	72,129	50,615	70.17	21,514	29.83
Washington	84,519	58,961	69.76	25,558	30.24
West Virginia	423	308	72.81	115	27.19
Wisconsin	85,742	60,646	70.73	25,096	29.27
Wyoming	4,169	2,576	61.79	1,593	38.21
United States	5,302,094	3,416,930	64.44	1,885,164	35.56

Appendix E: LUCA 98 adds by Type of Enumeration Area

State	Number of adds	TEA unknown		Appropriate TEAs		Inappropriate TEAs	
		Number	Percent	Number	Percent	Number	Percent
Alabama	81,345	1,827	2.25	77,443	95.20	2,075	2.55
Alaska	7,318	732	10.00	6,456	88.22	130	1.78
Arizona	233,832	81,440	34.83	149,980	64.14	2,412	1.03
Arkansas	45,538	1,317	2.89	20,740	45.54	23,481	51.56
California	562,243	11,735	2.09	543,784	96.72	6,724	1.20
Colorado	124,649	2,022	1.62	119,666	96.00	2,961	2.38
Connecticut	35,784	871	2.43	34,908	97.55	5	0.01
Delaware	4,556	0	0.00	4,490	98.55	66	1.45
District of Columbia	812	0	0.00	812	100.00	0	0.00
Florida	380,088	10,067	2.65	352,297	92.69	17,724	4.66
Georgia	360,675	10,046	2.79	344,703	95.57	5,926	1.64
Hawaii	55,315	0	0.00	54,966	99.37	349	0.63
Idaho	25,559	362	1.42	25,087	98.15	110	0.43
Illinois	444,557	8,298	1.87	435,242	97.90	1,017	0.23
Indiana	114,545	1,916	1.67	112,349	98.08	280	0.24
Iowa	42,549	331	0.78	38,664	90.87	3,554	8.35
Kansas	36,871	2,729	7.40	29,828	80.90	4,314	11.70
Kentucky	42,973	1,174	2.73	40,959	95.31	840	1.95
Louisiana	60,340	899	1.49	58,624	97.16	817	1.35
Maine	2,287	0	0.00	2,276	99.52	11	0.48
Maryland	98,401	635	0.65	96,638	98.21	1,128	1.15
Massachusetts	75,029	4,077	5.43	70,881	94.47	71	0.09
Michigan	191,014	144	0.08	189,845	99.39	1,025	0.54
Minnesota	70,062	1,222	1.74	67,372	96.16	1,468	2.10
Mississippi	26,410	2,205	8.35	23,909	90.53	296	1.12
Missouri	111,043	12,837	11.56	92,016	82.87	6,190	5.57
Montana	2,848	0	0.00	2,809	98.63	39	1.37
Nebraska	8,898	100	1.12	8,601	96.66	197	2.21
Nevada	21,065	0	0.00	20,987	99.63	78	0.37
New Hampshire	7,259	148	2.04	7,082	97.56	29	0.40
New Jersey	93,552	365	0.39	92,759	99.15	428	0.46
New Mexico	42,024	1,826	4.35	38,094	90.65	2,104	5.01
New York	507,881	1,129	0.22	506,545	99.74	207	0.04
North Carolina	142,209	3,189	2.24	132,595	93.24	6,425	4.52
North Dakota	3,902	0	0.00	3,891	99.72	11	0.28
Ohio	120,707	2,713	2.25	117,092	97.01	902	0.75
Oklahoma	38,150	7,244	18.99	19,061	49.96	11,845	31.05
Oregon	75,377	288	0.38	74,529	98.87	560	0.74
Pennsylvania	185,413	9,176	4.95	175,049	94.41	1,188	0.64
Rhode Island	13,021	1,058	8.13	11,963	91.87	0	0.00
South Carolina	157,838	2,653	1.68	152,125	96.38	3,060	1.94
South Dakota	9,581	150	1.57	5,314	55.46	4,117	42.97
Tennessee	119,230	1,088	0.91	115,383	96.77	2,759	2.31
Texas	217,454	5,485	2.52	199,797	91.88	12,172	5.60
Utah	53,846	3,211	5.96	44,331	82.33	6,304	11.71
Vermont	1,062	23	2.17	1,036	97.55	3	0.28
Virginia	72,129	1,092	1.51	70,779	98.13	258	0.36
Washington	84,519	2,504	2.96	80,200	94.89	1,815	2.15
West Virginia	423	0	0.00	283	66.90	140	33.10
Wisconsin	85,742	2,977	3.47	74,447	86.83	8,318	9.70
Wyoming	4,169	25	0.60	3,476	83.38	668	16.02
Total	5,302,094	203,330	3.83	4,952,163	93.40	146,601	2.76

Appendix F: LUCA 98 adds by official block code agreement

State	Number of adds	LUCA 98 did not provide a block code		LUCA 98 block is different from the official block		LUCA 98 block is the same as the official block	
		Number	Percent	Number	Percent	Number	Percent
Alabama	81,340	8,197	10.08	9,094	11.18	64,049	78.74
Alaska	7,316	6,434	87.94	73	1.00	809	11.06
Arizona	233,829	93,712	40.08	23,922	10.23	116,195	49.69
Arkansas	45,538	28,532	62.66	2,503	5.50	14,503	31.85
California	562,166	36,696	6.53	53,653	9.54	471,817	83.93
Colorado	124,636	76,007	60.98	4,711	3.78	43,918	35.24
Connecticut	35,781	24,404	68.20	1,297	3.62	10,080	28.17
Delaware	4,556	2	0.04	1,061	23.29	3,493	76.67
District of Columbia	848	0	0.00	10	1.18	838	98.82
Florida	380,060	99,063	26.07	48,645	12.80	232,352	61.14
Georgia	360,656	89,193	24.73	34,547	9.58	236,916	65.69
Hawaii	55,312	2	0.00	4,463	8.07	50,847	91.93
Idaho	25,554	1,734	6.79	3,580	14.01	20,240	79.20
Illinois	453,849	17,998	3.97	90,740	19.99	345,111	76.04
Indiana	114,541	15,972	13.94	15,563	13.59	83,006	72.47
Iowa	42,538	4,637	10.90	4,410	10.37	33,491	78.73
Kansas	36,868	22,445	60.88	1,998	5.42	12,425	33.70
Kentucky	42,967	13,257	30.85	3,542	8.24	26,168	60.90
Louisiana	60,328	38,427	63.70	3,936	6.52	17,965	29.78
Maine	2,286	1	0.04	302	13.21	1,983	86.75
Maryland	98,397	11,339	11.52	11,124	11.31	75,934	77.17
Massachusetts	75,004	40,158	53.54	3,986	5.31	30,860	41.14
Michigan	190,968	2,863	1.50	24,412	12.78	163,693	85.72
Minnesota	70,048	25,546	36.47	4,329	6.18	40,173	57.35
Mississippi	26,408	7,770	29.42	3,130	11.85	15,508	58.72
Missouri	111,039	55,878	50.32	9,747	8.78	45,414	40.90
Montana	2,846	4	0.14	391	13.74	2,451	86.12
Nebraska	8,897	3,266	36.71	858	9.64	4,773	53.65
Nevada	21,064	214	1.02	2,171	10.31	18,679	88.68
New Hampshire	7,259	1,583	21.81	1,129	15.55	4,547	62.64
New Jersey	93,546	3,849	4.11	13,260	14.17	76,437	81.71
New Mexico	42,022	38,970	92.74	860	2.05	2,192	5.22
New York	507,870	19,153	3.77	13,551	2.67	475,166	93.56
North Carolina	142,204	51,612	36.29	12,060	8.48	78,532	55.22
North Dakota	3,902	10	0.26	261	6.69	3,631	93.05
Ohio	120,688	14,642	12.13	13,898	11.52	92,148	76.35
Oklahoma	38,148	32,518	85.24	1,236	3.24	4,394	11.52
Oregon	75,358	8,032	10.66	12,141	16.11	55,185	73.23
Pennsylvania	185,378	12,710	6.86	24,238	13.07	148,430	80.07
Rhode Island	13,017	8,990	69.06	604	4.64	3,423	26.30
South Carolina	157,830	34,449	21.83	17,375	11.01	106,006	67.16
South Dakota	9,578	7,310	76.32	490	5.12	1,778	18.56
Tennessee	119,225	29,383	24.64	10,621	8.91	79,221	66.45
Texas	229,781	67,016	29.17	42,594	18.54	120,171	52.30
Utah	53,842	34,381	63.86	3,097	5.75	16,364	30.39
Vermont	1,062	582	54.80	55	5.18	425	40.02
Virginia	72,126	36,032	49.96	3,426	4.75	32,668	45.29
Washington	84,508	18,592	22.00	12,110	14.33	53,806	63.67
West Virginia	423	0	0.00	188	44.44	235	55.56
Wisconsin	85,730	16,550	19.30	7,588	8.85	61,592	71.84
Wyoming	4,167	683	16.39	476	11.42	3,008	72.19
Total	5,323,304	1,160,798	21.81	559,456	10.51	3,603,050	67.68

Appendix G: LUCA 98 adds by DMAF deliverability

State	Number of adds	Delivered to DMAF		Not Delivered to DMAF	
		Number	Percent	Number	Percent
Alabama	81,345	78,665	96.71	2,680	3.29
Alaska	7,318	6,581	89.93	737	10.07
Arizona	233,832	150,838	64.51	82,994	35.49
Arkansas	45,538	43,340	95.17	2,198	4.83
California	562,243	549,075	97.66	13,168	2.34
Colorado	124,649	122,138	97.99	2,511	2.01
Connecticut	35,784	34,593	96.67	1,191	3.33
Delaware	4,556	4,556	100.00	0	0.00
District of Columbia	812	812	100.00	0	0.00
Florida	380,088	365,050	96.04	15,038	3.96
Georgia	360,675	347,987	96.48	12,688	3.52
Hawaii	55,315	55,315	100.00	0	0.00
Idaho	25,559	25,180	98.52	379	1.48
Illinois	444,557	436,064	98.09	8,493	1.91
Indiana	114,545	112,436	98.16	2,109	1.84
Iowa	42,549	42,075	98.89	474	1.11
Kansas	36,871	32,607	88.44	4,264	11.56
Kentucky	42,973	41,577	96.75	1,396	3.25
Louisiana	60,340	59,357	98.37	983	1.63
Maine	2,287	2,287	100.00	0	0.00
Maryland	98,401	97,315	98.90	1,086	1.10
Massachusetts	75,029	70,753	94.30	4,276	5.70
Michigan	191,014	190,815	99.90	199	0.10
Minnesota	70,062	68,642	97.97	1,420	2.03
Mississippi	26,410	24,190	91.59	2,220	8.41
Missouri	111,043	96,673	87.06	14,370	12.94
Montana	2,848	2,848	100.00	0	0.00
Nebraska	8,898	8,782	98.70	116	1.30
Nevada	21,065	21,054	99.95	11	0.05
New Hampshire	7,259	6,451	88.87	808	11.13
New Jersey	93,552	93,182	99.60	370	0.40
New Mexico	42,024	39,363	93.67	2,661	6.33
New York	507,881	506,652	99.76	1,229	0.24
North Carolina	142,209	136,728	96.15	5,481	3.85
North Dakota	3,902	3,900	99.95	2	0.05
Ohio	120,707	117,508	97.35	3,199	2.65
Oklahoma	38,150	28,333	74.27	9,817	25.73
Oregon	75,377	75,055	99.57	322	0.43
Pennsylvania	185,413	176,122	94.99	9,291	5.01
Rhode Island	13,021	11,939	91.69	1,082	8.31
South Carolina	157,838	154,929	98.16	2,909	1.84
South Dakota	9,581	7,001	73.07	2,580	26.93
Tennessee	119,230	117,624	98.65	1,606	1.35
Texas	217,454	206,186	94.82	11,268	5.18
Utah	53,846	48,854	90.73	4,992	9.27
Vermont	1,062	1,039	97.83	23	2.17
Virginia	72,129	70,844	98.22	1,285	1.78
Washington	84,519	81,848	96.84	2,671	3.16
West Virginia	423	423	100.00	0	0.00
Wisconsin	85,742	80,937	94.40	4,805	5.60
Wyoming	4,169	3,956	94.89	213	5.11
United States	5,302,094	5,060,479	95.44	241,615	4.56

Appendix H: Final census status of LUCA 98 adds

State	Number of adds	In Census		Not in Census	
		Number	Percent	Number	Percent
Alabama	81,345	52,490	64.53	28,855	35.47
Alaska	7,318	4,868	66.52	2,450	33.48
Arizona	233,832	99,659	42.62	134,173	57.38
Arkansas	45,538	33,703	74.01	11,835	25.99
California	562,243	300,315	53.41	261,928	46.59
Colorado	124,649	70,891	56.87	53,758	43.13
Connecticut	35,784	16,988	47.47	18,796	52.53
Delaware	4,556	3,346	73.44	1,210	26.56
District of Columbia	812	412	50.74	400	49.26
Florida	380,088	236,264	62.16	143,824	37.84
Georgia	360,675	229,091	63.52	131,584	36.48
Hawaii	55,315	3,830	6.92	51,485	93.08
Idaho	25,559	19,938	78.01	5,621	21.99
Illinois	444,557	129,975	29.24	314,582	70.76
Indiana	114,545	50,885	44.42	63,660	55.58
Iowa	42,549	33,893	79.66	8,656	20.34
Kansas	36,871	26,555	72.02	10,316	27.98
Kentucky	42,973	32,707	76.11	10,266	23.89
Louisiana	60,340	22,606	37.46	37,734	62.54
Maine	2,287	1,860	81.33	427	18.67
Maryland	98,401	73,335	74.53	25,066	25.47
Massachusetts	75,029	41,736	55.63	33,293	44.37
Michigan	191,014	133,950	70.13	57,064	29.87
Minnesota	70,062	37,883	54.07	32,179	45.93
Mississippi	26,410	16,731	63.35	9,679	36.65
Missouri	111,043	67,600	60.88	43,443	39.12
Montana	2,848	2,083	73.14	765	26.86
Nebraska	8,898	7,039	79.11	1,859	20.89
Nevada	21,065	14,823	70.37	6,242	29.63
New Hampshire	7,259	4,513	62.17	2,746	37.83
New Jersey	93,552	66,886	71.50	26,666	28.50
New Mexico	42,024	18,432	43.86	23,592	56.14
New York	507,881	280,943	55.32	226,938	44.68
North Carolina	142,209	106,969	75.22	35,240	24.78
North Dakota	3,902	2,742	70.27	1,160	29.73
Ohio	120,707	91,324	75.66	29,383	24.34
Oklahoma	38,150	23,515	61.64	14,635	38.36
Oregon	75,377	50,552	67.07	24,825	32.93
Pennsylvania	185,413	108,049	58.27	77,364	41.73
Rhode Island	13,021	4,412	33.88	8,609	66.12
South Carolina	157,838	92,972	58.90	64,866	41.10
South Dakota	9,581	5,626	58.72	3,955	41.28
Tennessee	119,230	86,808	72.81	32,422	27.19
Texas	217,454	152,233	70.01	65,221	29.99
Utah	53,846	28,980	53.82	24,866	46.18
Vermont	1,062	647	60.92	415	39.08
Virginia	72,129	57,674	79.96	14,455	20.04
Washington	84,519	53,715	63.55	30,804	36.45
West Virginia	423	354	83.69	69	16.31
Wisconsin	85,742	56,469	65.86	29,273	34.14
Wyoming	4,169	3,165	75.92	1,004	24.08
Total	5,302,094	3,062,436	57.76	2,239,658	42.24

Appendix I: LUCA 98 deletes by state

State	Number of deletes	Percent of total
Alabama	9,788	2.00
Alaska	205	0.04
Arizona	4,762	0.97
Arkansas	2,916	0.59
California	21,969	4.48
Colorado	11,091	2.26
Connecticut	8,566	1.75
Delaware	925	0.19
District of Columbia	0	0.00
Florida	15,505	3.16
Georgia	13,413	2.73
Hawaii	84	0.02
Idaho	1,157	0.24
Illinois	17,576	3.58
Indiana	8,269	1.69
Iowa	12,342	2.52
Kansas	4,973	1.01
Kentucky	5,088	1.04
Louisiana	5,378	1.10
Maine	2,516	0.51
Maryland	8,303	1.69
Massachusetts	19,963	4.07
Michigan	52,123	10.62
Minnesota	7,863	1.60
Mississippi	4,919	1.00
Missouri	9,245	1.88
Montana	750	0.15
Nebraska	5,045	1.03
Nevada	888	0.18
New Hampshire	4,970	1.01
New Jersey	25,288	5.15
New Mexico	2,104	0.43
New York	34,116	6.96
North Carolina	9,359	1.91
North Dakota	1,575	0.32
Ohio	15,045	3.07
Oklahoma	3,036	0.62
Oregon	4,916	1.00
Pennsylvania	38,297	7.81
Rhode Island	1,252	0.26
South Carolina	10,225	2.08
South Dakota	1,066	0.22
Tennessee	8,654	1.76
Texas	32,651	6.66
Utah	2,708	0.55
Vermont	79	0.02
Virginia	4,493	0.92
Washington	7,021	1.43
West Virginia	51	0.01
Wisconsin	26,899	5.48
Wyoming	1,186	0.24
United States	490,613	100.00

Appendix J: LUCA 98 corrections by state

State	Number of corrections	Percent of national total
Alabama	19,975	0.72
Alaska	361	0.01
Arizona	29,466	1.07
Arkansas	14,237	0.52
California	374,136	13.55
Colorado	12,656	0.46
Connecticut	25,829	0.94
Delaware	908	0.03
District of Columbia	0	0.00
Florida	79,927	2.89
Georgia	58,200	2.11
Hawaii	55	0.00
Idaho	4,786	0.17
Illinois	60,252	2.18
Indiana	21,052	0.76
Iowa	18,363	0.66
Kansas	100,904	3.65
Kentucky	15,327	0.55
Louisiana	9,842	0.36
Maine	952	0.03
Maryland	20,677	0.75
Massachusetts	50,969	1.85
Michigan	90,875	3.29
Minnesota	24,984	0.90
Mississippi	8,358	0.30
Missouri	10,951	0.40
Montana	595	0.02
Nebraska	15,369	0.56
Nevada	2,179	0.08
New Hampshire	1,751	0.06
New Jersey	66,446	2.41
New Mexico	3,650	0.13
New York	913,191	33.06
North Carolina	60,475	2.19
North Dakota	1,511	0.05
Ohio	109,257	3.96
Oklahoma	1,553	0.06
Oregon	5,591	0.20
Pennsylvania	66,299	2.40
Rhode Island	1,364	0.05
South Carolina	128,617	4.66
South Dakota	1,259	0.05
Tennessee	46,414	1.68
Texas	98,528	3.57
Utah	90,203	3.27
Vermont	494	0.02
Virginia	28,016	1.01
Washington	20,570	0.74
West Virginia	37	0.00
Wisconsin	40,363	1.46
Wyoming	4,276	0.15
Total	2,762,050	100.00

Appendix K: LUCA 98 adds in the final census that were not added by any other valid operation

State	Number of LUCA 98 only adds	Percent of total*
Alabama	6,477	1.28
Alaska	690	0.14
Arizona	11,630	2.30
Arkansas	1,300	0.26
California	35,550	7.03
Colorado	5,339	1.06
Connecticut	3,680	0.73
Delaware	451	0.09
District of Columbia	89	0.02
Florida	18,824	3.72
Georgia	30,295	5.99
Hawaii	2,327	0.46
Idaho	832	0.16
Illinois	45,333	8.97
Indiana	6,377	1.26
Iowa	2,494	0.49
Kansas	1,680	0.33
Kentucky	2,136	0.42
Louisiana	8,746	1.73
Maine	149	0.03
Maryland	12,212	2.42
Massachusetts	8,992	1.78
Michigan	26,151	5.17
Minnesota	4,047	0.80
Mississippi	3,923	0.78
Missouri	3,607	0.71
Montana	78	0.02
Nebraska	361	0.07
Nevada	497	0.10
New Hampshire	664	0.13
New Jersey	10,217	2.02
New Mexico	1,133	0.22
New York	158,514	31.36
North Carolina	6,652	1.32
North Dakota	215	0.04
Ohio	9,664	1.91
Oklahoma	624	0.12
Oregon	4,154	0.82
Pennsylvania	14,245	2.82
Rhode Island	751	0.15
South Carolina	13,926	2.75
South Dakota	227	0.04
Tennessee	7,841	1.55
Texas	12,438	2.46
Utah	2,324	0.46
Vermont	148	0.03
Virginia	3,698	0.73
Washington	5,241	1.04
West Virginia	64	0.01
Wisconsin	8,349	1.65
Wyoming	174	0.03
Total	505,530	99.98

* Total does not sum to 100.00 due to rounding.
